Annual Water Data Report

Documentation

Downstream order and station number

Since October 1, 1950, hydrologic-station records in USGS reports have been listed in order of downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary entering between two mainstream stations is listed between those stations. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is located with respect to the stream to which it is immediately tributary is indicated by an indention in that list of stations in the front of this report. Each indentation represents one rank. This downstream order and system of indentation indicates which stations are on tributaries between any two stations and the rank of the tributary on which each station is located.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These station numbers are in the same downstream order used in this report. In assigning a station number, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list composed of both types of stations. Gaps are consecutive. The complete 8-digit (or 10-digit) number for each station such as 09004100, which appears just to the left of the station name, includes a 2-digit part number "09" plus the 6-digit (or 8-digit) downstream order number "004100." In areas of high station density, an additional two digits may be added to the station identification number to yield a 10-digit number. The stations are numbered in downstream order as described above between stations of consecutive 8- digit numbers.

Numbering system for wells and miscellaneous sites

The USGS well and miscellaneous site-numbering system is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, and the next 7 digits denote degrees, minutes, and seconds of longitude; the last 2 digits are a sequential number for wells within a 1-second grid. In the event that the latitude-longitude coordinates for a well and miscellaneous site are the same, a sequential number such as "01," "02," and so forth, would be assigned as one would for wells (see fig. 1). The 8-digit, downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

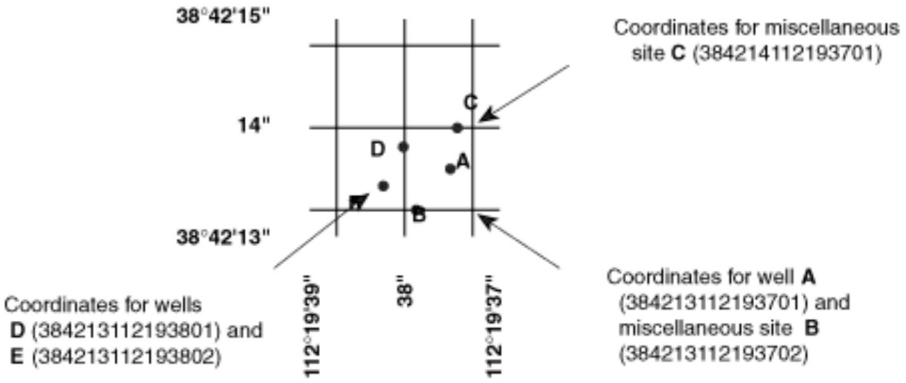


Figure 1. Example of system for numbering wells and miscellaneous sites (latitude and longitude).

In addition to the well number that is based on the latitude and longitude for each well, another well number may be provided which in many States is based on the Public Land Survey System, a set of rectangular surveys that is used to identify land parcels. This well number is familiar to the water users in, for example, Utah and shows the location of the well by quadrant, township, range section, and position within the section (see fig. 2).

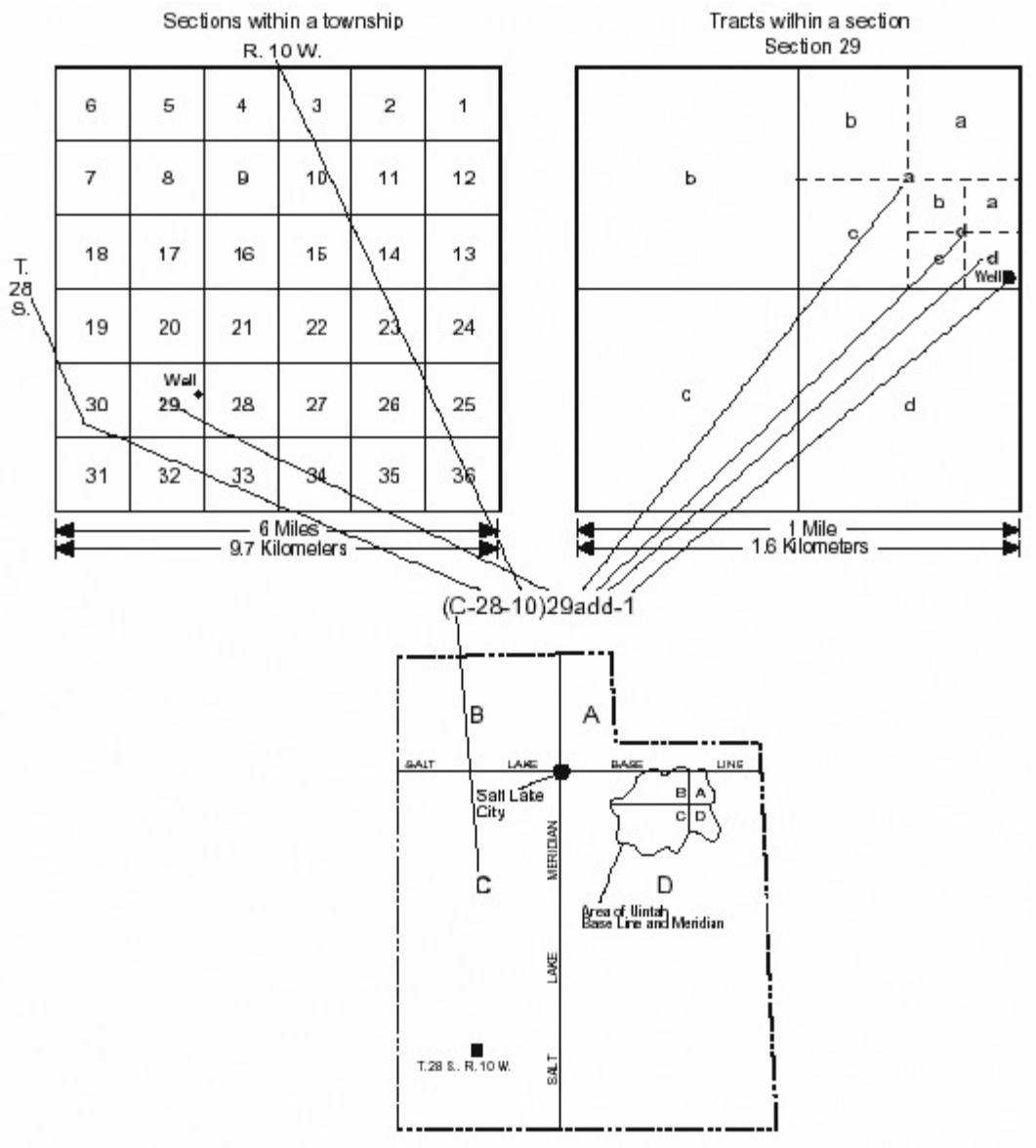


Figure 2. Example of system for numbering wells and miscellaneous sites (township and range).

Some Water Science Centers also identify each ground-water site by a local number that consists of an abbreviation of the county name as well as the township, range and section, and a four-digit number assigned to the well. Naming conventions specific to an individual Water Science Center can be obtained locally from each USGS Water Science Center.

Explanation of stage- and water-discharge records

Data Collection and Computation

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and volume of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from a water-stage recorder that is either downloaded electronically in the field to a laptop computer or similar device or is transmitted using telemetry such as GOES satellite, land-line or cellular-phone modems, or by radio transmission. Measurements of discharge are made with a current meter or acoustic Doppler current profiler, using the general methods adopted by the USGS. These methods are described in standard textbooks, USGS Water- Supply Paper 2175, and the Techniques of Water-Resources Investigations of the United States Geological Survey (TWRIs), Book 3, Chapters A1

through A19 and Book 8, Chapters A2 and B2, which may be accessed from http://water.usgs.gov/pubs/twri/. The methods are consistent with the American Society for Testing and Materials (ASTM) standards and generally follow the standards of the International Organization for Standardization (ISO).

For stream-gaging stations, discharge-rating tables for any stage are prepared from stage-discharge curves. If extensions to the rating curves are necessary to express discharge greater than measured, the extensions are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, or computation of flow over dams and weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharges are computed from the daily values. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features of the stream channel, the daily mean discharge is computed by the shifting-control method in which correction factors that are based on individual discharge measurements and notes by engineers and observers are used when applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the controlling section, the daily mean discharge is computed by the shifting-control method.

The stage-discharge relation at some stream-gaging stations is affected by backwater from reservoirs, tributary streams, or other sources. Such an occurrence necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage at some distance from the base gage. An index velocity is measured using ultrasonic or acoustic instruments at some stream-gaging stations, and this index velocity is used to calculate an average velocity for the flow in the stream. This average velocity along with a stage-area relation is then used to calculate average discharge. At some stations, the stage-discharge relation is affected by changing stage. At these stations, the rate of change in stage is used as a factor in computing discharge.

At some stream-gaging stations in the northern United States, the stage-discharge relation is affected by ice in the winter; therefore, computation of the discharge in the usual manner is impossible. Discharge for periods of ice effect is computed on the basis of gage-height record and occasional winter-discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge from other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the volume or contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly changes are computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys, the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some stream-gaging stations, periods of time occur when no gage-height record is obtained or the recorded gage height is faulty and cannot be used to compute daily discharge or contents. Such a situation can happen when the recorder stops or otherwise fails to operate properly, the intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods, the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records from other stations in the same or nearby basins. Likewise, lake or reservoir volumes may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

Data Presentation

The records published for each continuous record surface-water discharge station (stream-gaging station) consist of five parts: (1) the station manuscript or description; (2) the data table of daily mean values of discharge for the current water year with summary data; (3) a tabular statistical summary of monthly mean flow data for a designated period, by water year; (4) a summary statistics table that includes

statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration; and (5) a hydrograph of discharge.

Station Manuscript

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments follow that clarify information presented under the various headings of the station description.

LOCATION.-Location information is obtained from the most accurate maps available. The location of the gaging station with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

DRAINAGE AREA.-Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. Drainage areas are updated as better maps become available.

PERIOD OF RECORD.-This term indicates the time period for which records have been published for the station or for an equivalent station. An equivalent station is one that was in operation at a time that the present station was not and whose location was such that its flow reasonably can be considered equivalent to flow at the present station.

REVISED RECORDS.-If a critical error in a published site data sheet is discovered, a revision is included (where?) in the next publishing cycle following discovery of the error.

GAGE.-The type of gage in current use, the datum of the current gage referred to a standard datum, and a condensed history of the types, locations, and datums of previous gages are given under this heading.

REMARKS.-All periods of estimated daily discharge either will be identified by date in this paragraph of the station description for water discharge stations or flagged in the daily discharge table. (See section titled Identifying Estimated Daily Discharge.) Information is presented relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, the outlet works and spillway, and the purpose and use of the reservoir.

COOPERATION.-Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD.-Information here documents major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the USGS.

REVISIONS.-Records are revised if errors in published records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based national data system, NWISWeb (http://water.usgs.gov/nwis/nwis). Users are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent data updates. Updates to NWISWeb are made on an annual basis.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because no current or, possibly, future station manuscript would be published for these stations to document the revision in a REVISED RECORDS entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the USGS Water Science Center in the state where the station is located to determine if the published records were revised after the station was discontinued.

If, however, the data for a discontinued station were obtained by computer retrieval, the data would be current. Any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the REMARKS and in the inclusion of a stage-capacity table when daily volumes are given.

Peak Discharge Greater than Base Discharge

Tables of peak discharge above base discharge are included for some stations where secondary instantaneous peak discharge data are used in flood-frequency studies of highway and bridge design, flood-control structures, and other flood related projects. The base discharge value is selected so an average of three peaks a year will be reported. This base discharge value has a recurrence interval of approximately 1.1 years or a 91-percent chance of exceedence in any 1 year.

Data Table of Daily Mean Values

The daily table of discharge records for streamgaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed TOTAL gives the sum of the daily figures for each month; the line headed MEAN gives the arithmetic average flow in cubic feet per second for the month; and the lines headed MAX and MIN give the maximum and minimum daily mean discharges, respectively, for each month. Discharge for the month is expressed in cubic feet per second per square mile (line headed CFSM); or in inches (line headed IN); or in acrefeet (line headed AC-FT). Values for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if extensive regulation or diversion is in effect or if the drainage area includes large noncontributing areas. At some stations, monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir volumes are given. These values are identified by a symbol and a corresponding footnote.

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed MEAN), maximum (MAX), and minimum (MIN) of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those values. The designated period will be expressed as FOR WATER YEARS __-__, BY WATER YEAR (WY), and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. The designated period will consist of all of the station record within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are consecutive, unless a break in the station record is indicated in the manuscript.

Summary Statistics

A table titled SUMMARY STATISTICS follows the statistics of monthly mean data tabulation. This table consists of four columns with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, WATER YEARS __-__, will consist of all of the station records within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (see line headings below), except for the ANNUAL 7-DAY MINIMUM statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years. The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the

manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the heading. When the dates of occurrence do not fall within the selected water years listed in the heading, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration-curve statistics and runoff data also are given. Runoff data may be omitted if extensive regulation or diversion of flow is in effect in the drainage basin.

The following summary statistics data are provided with each continuous record of discharge. Comments that follow clarify information presented under the various line headings of the SUMMARY STATISTICS table.

ANNUAL TOTAL.-The sum of the daily mean values of discharge for the year.

ANNUAL MEAN.-The arithmetic mean for the individual daily mean discharges for the year noted or for the designated period.

HIGHEST ANNUAL MEAN.-The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.-The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.-The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.-The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.-The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. This value should not be confused with the 7-day 10-year low-flow statistic.

MAXIMUM PEAK FLOW.-The maximum instantaneous peak discharge occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak flow is given in the table and the maximum flow may be reported in a footnote or in the REMARKS paragraph in the manuscript.

MAXIMUM PEAK STAGE.-The maximum instantaneous peak stage occurring for the water year or designated period. Occasionally the maximum stage for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak stage is given in the table and the maximum stage may be reported in the REMARKS paragraph in the manuscript or in a footnote. If the dates of occurrence of the maximum peak stage and maximum peak flow are different, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.-The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF.-Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicate the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.-The discharge that has been exceeded 10 percent of the time for the designated period.

50 PERCENT EXCEEDS.-The discharge that has been exceeded 50 percent of the time for the designated period.

90 PERCENT EXCEEDS.-The discharge that has been exceeded 90 percent of the time for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first table lists annual maximum stage and discharge at crest-stage stations, and the second table lists discharge measurements at lowflow partial-record stations. The tables of partialrecord stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are often made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for a special reason are called measurements at miscellaneous sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified. This identification is shown either by flagging individual daily values with the letter "e" and noting in a table footnote, "e- Estimated," or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Accuracy of Field Data and Computed Results

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretations of records.

The degree of accuracy of the records is stated in the REMARKS in the station description. "Excellent" indicates that about 95 percent of the daily discharges are within 5 percent of the true value; "good" within 10 percent; and "fair," within 15 percent. "Poor" indicates that daily discharges have less than "fair" accuracy. Different accuracies may be attributed to different parts of a given record.

Values of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 ft^3/s; to the nearest tenths between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1,000 ft^3/s; and to three significant figures above 1,000 ft^3/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharge values listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, values of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other Data Records Available

Information of a more detailed nature than that published for most of the stream-gaging stations such as discharge measurements, gage-height records, and rating tables is available from the USGS Water Science Center. Also, most streamgaging station records are available in computer usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the USGS Water Science Center in the state where the station is located.

Explanation of precipitation records

Data Collection and Computation

Rainfall data generally are collected using electronic data loggers that measure the rainfall in 0.01-inch increments every 15 minutes using either a tipping-bucket rain gage or a collection well gage. Twenty-four hour rainfall totals are tabulated and presented. A 24-hour period extends from just past midnight of the previous day to midnight of the current day. Snowfall-affected data can result during cold weather when snow fills the rain-gage funnel and then melts as temperatures rise. Snowfall-affected data are subject to errors. Missing values are indicated by this symbol "---" in the table.

Data Presentation

Precipitation records collected at surface-water gaging stations are identified with the same station number and name as the stream-gaging station. Where a surface-water daily-record station is not available, the precipitation record is published with its own name and latitude-longitude identification number.

Information pertinent to the history of a precipitation station is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, period of record, and general remarks. The following information is provided with each precipitation station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.-See Data Presentation in the EXPLANATION OF STAGE- AND WATERDISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.-See Data Presentation in the EXPLANATION OF STAGE- AND WATERDISCHARGE RECORDS section of this report (same comments apply).

INSTRUMENTATION.-Information on the type of rainfall collection system is given.

REMARKS.-Remarks provide added information pertinent to the collection, analysis, or computation of records.

Explanation of water-quality records

Collection and Examination of Data Surface-water samples for analysis usually are collected at or near stream-gaging stations. The quality-of-water records are given immediately following the discharge records at these stations. The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, and so forth); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, sampling date, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most of the methods used for collecting and analyzing water samples are described in the TWRIs, which may be accessed from http:// water.usgs.gov/pubs/twri/.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary considerably with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled at several verticals to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum and minimum values (and sometimes mean or median values) for each constituent measured and are based on 15-minute or 1-hour intervals of recorded data beginning at 0000 hours and ending at 2400 hours for the day of record.

Parameter Codes

See link.

Medium Codes

See link.

Surface-water-quality records

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because discharge data are useful in the interpretation of surface-water quality. Records of surface-water quality in this report involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A continuous-record station is a site where data are collected on a regularly scheduled basis. Frequency may be one or more times daily, weekly, monthly, or quarterly. A partial-record station is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A miscellaneous sampling site is a location other than a continuous- or partial-record station, where samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between continuous records as used in this report and continuous recordings that refer to a continuous graph or a series of discrete values recorded at short intervals. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report may be published as a USGS Annual Scientific Investigations Report by State, and may be accessed from http://pubs.usgs.gov, or the Related Information and Publications page of this Web Site.

Accuracy of the Records

One of four accuracy classifications is applied for measured physical properties at continuous-record stations on a scale ranging from poor to excellent. The accuracy rating is based on data values recorded before any shifts or corrections are made. Additional consideration also is given to the amount of publishable record and to the amount of data that have been corrected or shifted.

Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the water quality differs

significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

Onsite Measurements and Sample Collection

In obtaining water-quality data, a major concern is assuring that the data obtained represent the naturally occurring quality of the water. To ensure this, certain measurements, such as water temperature, pH, and dissolved oxygen, must be made onsite when the samples are collected. To assure that measurements made in the laboratory also represent the naturally occurring water, carefully prescribed procedures must be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1-A9. Most of the methods used for collecting and analyzing water samples are described in the TWRIs, which may be accessed from http://water.usgs.gov/pubs/twri/. Also, detailed information on collecting, treating, and shipping samples can be obtained from the USGS Water Science Center.

Rating the accuracy of continuous water-quality records
[≤, less than or equal to; ±, plus or minus value shown; °C, degree Celsius; >, greater than; %, percent; mg/L, milligram per liter; pH unit, standard pH unit]

Measured field parameter	**Ratings of accuracy (Based on combined fouling and calibration drift corrections applied to the record)**			
	Excellent	**Good**	**Fair**	**Poor**
Water temperature	≤ ± 0.2 °C	> ± 0.2 - 0.5 °C	> ± 0.5 - 0.8 °C	> ± 0.8 °C
Specific conductance	≤ ± 3%	> ± 3 - 10%	> ± 10 - 15%	> ± 15%
Dissolved oxygen	≤ ± 0.3 mg/L or ≤ ± 5%, whichever is greater	> ± 0.3 - 0.5 mg/L or > ± 5 - 10%, whichever is greater	> ± 0.5 - 0.8 mg/L or > ± 10 - 15%, whichever is greater	> ± 0.8 mg/L or > ± 15%, whichever is greater
pH	≤ ± 0.2 units	> ± 0.2 - 0.5 units	> ± 0.5 - 0.8 units	> ± 0.8 units
Turbidity	≤ ± 0.5 turbidity units or ≤ ± 5%, whichever is greater	> ± 0.5 - 1.0 turbidity units or > ± 5 - 10%, whichever is greater	> ± 1.0 - 1.5 turbidity units or > ± 10 - 15%, whichever is greater	> ± 1.5 turbidity units or > ± 15%, whichever is greater

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at the time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same

time each day. Large streams have a small diurnal temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water discharge-measurements are on file in the USGS Water Science Center in the State where the station is located.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross section.

During periods of rapidly changing flow or rapidly changing concentration, samples may be collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration are computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily discharges of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow and in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of suspended-sediment discharge, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for biochemical oxygen demand (BOD) and indicator bacteria are analyzed locally. All other samples are analyzed in the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chapter C1. Methods used by the USGS laboratories are given in the TWRIs, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. The TWRI publications may be accessed from http://water.usgs.gov/pubs/twri/. These methods are consistent with ASTM standards and generally follow ISO standards.

Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of "daily values" of specific conductance, pH, water temperature, dissolved oxygen, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.-See Data Presentation information in the EXPLANATION OF STAGE- AND WATER-DISCHARGE

RECORDS section of this report (same comments apply).

DRAINAGE AREA.-See Data Presentation information in the EXPLANATION OF STAGEAND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.-This indicates the time periods for which published water-quality records for the station are available. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

INSTRUMENTATION.-Information on instrumentation is given only if a water-quality monitor temperature record, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS.-Remarks provide added information pertinent to the collection, analysis, or computation of the records.

COOPERATION.-Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here. EXTREMES.-Maximums and minimums are given only for parameters measured daily or more frequently. For parameters measured weekly or less frequently, true maximums or minimums may not have been obtained. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.-Records are revised if errors in published water-quality records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based national data system, NWISWeb (http://waterdata.usgs.gov/nwis). Users of USGS water-quality data are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent updates. Updates to the NWISWeb are made on an annual basis.

The surface-water-quality records for partialrecord stations and miscellaneous sampling sites are published in separate tables following the table of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

The following remark codes may appear with the water-quality data in this section:

Printed Output	Remark
E	Value is estimated.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
M	Presence of material verified, but not quantified.
N	Presumptive evidence of presence of material.
U	Material specifically analyzed for, but not detected.
A	Value is an average.
V	Analyte was detected in both the environmental sample and the associated blanks.
S	Most probable value.

Water-Quality Control Data

The USGS National Water Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LTMDLs) and laboratory reporting levels (LRLs). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. Falsely reporting a concentration greater than the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a nondetection for

a sample in which the analyte is present at a concentration equal to or greater than the LRL is 1 percent or less.

Accordingly, concentrations are reported as less than LRL for samples in which the analyte either was not detected or did not pass identification. Analytes detected at concentrations between the LT-MDL and the LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of "E." These data should be used with the understanding that their uncertainty is greater than that of data reported without the E remark code.

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by a USGS Water Science Center are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples. These data are not presented in this report but are available from the USGS Water Science Center in the State where the Station is located.

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated in the overall data-collection process. The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. Many types of blank samples are possible; each is designed to segregate a different part of the overall data-collection process. The types of blank samples potentially collected by USGS Water Science Centers are:

Field blank-A blank solution that is subjected to all aspects of sample collection, field processing preservation, transportation, and laboratory handling as an environmental sample.

Trip blank-A blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

Equipment blank-A blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank but normally done in the more controlled conditions of the office).

Sampler blank-A blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

Filter blank-A blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

Splitter blank-A blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

Preservation blank-A blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory. The reference material composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. Many types of replicate samples are possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this district are:

Concurrent samples-A type of replicate sample in which the samples are collected simultaneously with two or more samplers or by using one sampler and alternating the collection of samples into two or more compositing containers.

Sequential samples-A type of replicate sample in which the samples are collected one after the other, typically over a short time.

Split sample-A type of replicate sample in which a sample is split into subsamples, each subsample contemporaneous in time and space.

Spike Samples

Spike samples are samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

Explanation of ground-water level records

Generally, only ground-water-level data from selected wells with continuous recorders from a basic network of observation wells are published in this report. This basic network contains observation wells located so that the most significant data are obtained from the fewest wells in the most important aquifers.

Site Identification Numbers

Each well is identified by means of (1) a 15- digit number that is based on latitude and longitude and (2) a local number that is produced for local needs. See NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES in this report for a detailed explanation.

Data Collection and Computation

Measurements are made in many types of wells, under varying conditions of access and at different temperatures; hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Most methods for collecting and analyzing water samples are described in the TWRIs referred to in the Onsite Measurements and Sample Collection and the Laboratory Measurements sections in this report. In addition, TWRI Book 1, Chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected unstable constituents. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1 through A9. The TWRI publications may be accessed from http://water.usgs.gov/pubs/twri/. The values in this report represent water-quality conditions at the time of sampling, as much as possible, and that are consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. Trained personnel collected all samples. The wells sampled were pumped long enough to ensure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Water-level measurements in this report are given in feet with reference to land-surface datum (lsd). Land-surface datum is a datum plane that is approximately at land surface at each well. If known, the

elevation of the land-surface datum above sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth of water of several hundred feet, the error in determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Data Presentation

Water-level data are presented in alphabetical order by county. The primary identification number for a given well is the 15-digit site identification number that appears in the upper left corner of the table. The secondary identification number is the local or county well number. Well locations are shown and each well is identified by its local well or county well number on a map in the local Water Science Center's Annual Scientific Investigation Report by State, and may be accessed from. . .

Each well record consists of three parts: the well description, the data table of water levels observed during the water year, and, for most wells, a hydrograph following the data table. Well descriptions are presented in the headings preceding the tabular data. The following comments clarify information presented in these various headings.

LOCATION.-This paragraph follows the well-identification number and reports the hydrologic-unit number and a geographic point of reference. Latitudes and longitudes used in this report are reported as North American Datum of 1927 unless otherwise specified.

AQUIFER-.This entry designates by name and geologic age the aquifer that the well taps.

WELL CHARACTERISTICS-.This entry describes the well in terms of depth, casing diameter and depth or screened interval, method of construction, use, and changes since construction.

INSTRUMENTATION-.This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on continuous, monthly, or some other frequency of measurement.

DATUM-.This entry describes both the measuring point and the land-surface elevation at the well. The altitude of the land-surface datum is described in feet above the altitude datum; it is reported with a precision depending on the method of determination. The measuring point is described physically (such as top of casing, top of instrument shelf, and so forth), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above National Geodetic Vertical Datum of 1929 (NGVD 29); it is reported with a precision depending on the method of determination.

REMARKS-.This entry describes factors that may affect the water level in a well or the measurement of the water level, when various methods of measurement were begun, and the network (climatic, terra ne, local, or areal effects) or the special project to which the well belongs.

PERIOD OF RECORD.-This entry indicates the time period for which records are published for the well, the month and year at the start of publication of water-level records by the USGS, and the words "to current year" if the records are to be continued into the following year. Time periods for which water-level records are available, but are not published by the USGS, may be noted.

EXTREMES FOR PERIOD OF RECORD.-This entry contains the highest and lowest instantaneously recorded or measured water levels of the period of published record, with respect to land-surface datum or sea level, and the dates of occurrence.

Water-Level Tables

A table of water levels follows the well description for each well. Water-level measurements in this report are given in feet with reference to either sea level or land-surface datum (lsd). Missing records are indicated by dashes in place of the water-level value.

For wells not equipped with recorders, water-level measurements were obtained periodically by steel or electric tape. Tables of periodic water-level measurements in these wells show the date of measurement and the measured water-level value.

Hydrographs

Hydrographs are a graphic display of water-level fluctuations over a period of time. In this report, current water year and, when appropriate, period-of-record hydrographs are shown.

Hydrographs that display periodic water-level measurements show points that may be connected with a dashed line from one measurement to the next. Hydrographs that display recorder data show a solid line representing the mean water level recorded for each day. Missing data are indicated by a blank space or break in a hydrograph. Missing data may occur as a result of recorder malfunctions, battery failures, or mechanical problems related to the response of the recorder's float mechanism to water-level fluctuations in a well.

Ground-water-quality data

Data Collection and Computation

The ground-water-quality data in this report were obtained as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some wells within a county but not for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality statewide. Most methods for collecting and analyzing water samples are described in the TWRIs, which may be accessed from http://water.usgs.gov/pubs/twri/. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in TWRI, Book 1, Chapter D2; Book 5, Chapters A1, A3, and A4; and Book 9, Chapters A1-A6. Also, detailed information on collecting, treating, and shipping samples may be obtained from the local USGS Water Science Center.

Laboratory Measurements

Analysis for sulfide and measurement of alkalinity, pH, water temperature, specific conductance, and dissolved oxygen are performed onsite. All other sample analyses are performed at the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used by the USGS laboratory are given in TWRI, Book 1, Chapter D2 and Book 5, Chapters A1, A3, and A4, which may be accessed from http://water.usgs.gov/pubs/twri/.

07121500 TIMPAS CREEK AT MOUTH NEAR SWINK, CO

Upper Arkansas Basin
Upper Arkansas-Lake Meredith Subbasin

LOCATION.--Lat 38°00′11″, long 103°39′20″ referenced to North American Datum of 1927, in NW ¼ SW ¼ sec.35, T.23 S., R.56 W., Otero County, CO, Hydrologic Unit 11020005, on right bank at downstream side of 23rd Road bridge, 1.7 mi southwest of Swink, and 2.9 mi upstream from mouth.

DRAINAGE AREA.--496 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--January 1922 to September 1925, March 1968 to current year. Monthly discharge only for some periods, published in WSP 1311.

REVISED RECORDS.--WDR CO 76-1: 1975.

GAGE.--Water-stage recorder with satellite telemetry and crest-stage gage. Elevation of gage is 4,120 ft above NGVD of 1929, from topographic map. Jan. 1922 to Sept. 1925 at several sites downstream at different datum. Mar. 1968 to May 29, 1975, at site 140 ft downstream at datum 0.13 ft lower. May 30, 1975 to Nov. 25, 1980, at site on left bank at same datum.

REMARKS.--No estimated daily discharges. Records fair except for Aug. 16 to Sept. 30, which are poor. Natural flow of stream affected by erosion-control and livestock-watering reservoirs, diversions for irrigation, ground-water withdrawals, and return flows from irrigated areas and from Catlin and Rocky Ford Highline Canals.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1922, 21,400 ft^3/s, June 17, 1965, gage height unknown.

07121500 TIMPAS CREEK AT MOUTH NEAR SWINK, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	70	70	25	16	29	17	66	83	59	91	60	79
2	69	76	41	16	30	17	61	87	62	88	53	76
3	70	81	30	16	34	17	61	85	82	88	64	71
4	73	80	22	17	36	17	64	76	86	82	69	56
5	73	89	22	19	29	17	59	69	95	82	75	60
6	67	95	22	19	24	17	56	65	94	92	76	70
7	64	95	21	17	22	17	56	69	88	113	79	73
8	66	90	21	17	21	17	66	70	104	97	95	73
9	71	87	22	18	22	17	64	83	99	103	92	81
10	70	89	21	18	22	17	72	85	83	96	104	75
11	67	80	22	18	21	22	103	81	74	82	96	63
12	66	76	20	17	29	31	89	74	75	79	109	56
13	69	79	20	17	32	25	93	77	80	81	127	57
14	77	77	21	17	29	32	80	75	81	75	112	51
15	75	78	19	17	27	53	59	76	85	67	236	66
16	74	34	19	17	27	144	63	80	85	66	274	90
17	76	24	19	17	27	123	122	67	87	63	153	87
18	77	26	19	17	22	98	99	63	81	61	169	78
19	81	26	19	17	21	52	68	66	84	241	157	69
20	82	24	19	18	20	55	78	64	85	69	112	58
21	96	23	19	18	20	55	75	75	106	58	92	62
22	102	22	18	26	20	55	72	82	91	59	75	58
23	101	22	18	27	20	55	61	77	91	60	95	59
24	97	22	18	27	19	48	64	75	86	62	140	65
25	85	22	19	29	19	42	70	72	85	66	103	65
26	80	21	18	31	19	44	71	70	87	66	68	65
27	81	21	17	31	18	53	78	68	83	60	59	69
28	81	21	17	32	18	55	76	77	79	57	73	66
29	79	21	17	29	17	56	76	76	79	64	70	60
30	77	22	17	27	---	48	80	60	85	57	103	56
31	75	---	17	32	---	52	---	54	---	57	88	---
Total	2,391	1,593	639	654	694	1,368	2,202	2,281	2,541	2,482	3,278	2,014
Mean	77.1	53.1	20.6	21.1	23.9	44.1	73.4	73.6	84.7	80.1	106	67.1
Max	102	95	41	32	36	144	122	87	106	241	274	90
Min	64	21	17	16	17	17	56	54	59	57	53	51
Ac-ft	4,740	3,160	1,270	1,300	1,380	2,710	4,370	4,520	5,040	4,920	6,500	3,990

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1922 - 2008, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	84.0	71.6	31.7	21.5	28.1	56.2	64.7	75.6	81.1	72.9	83.1	69.5
Max	265	210	109	60.4	84.6	201	170	187	318	200	401	159
(WY)	(1924)	(1924)	(1971)	(1923)	(1924)	(1924)	(1924)	(1995)	(1923)	(1923)	(1923)	(1986)
Min	9.21	12.8	5.22	5.34	6.10	15.9	11.0	14.0	21.9	13.0	10.6	9.60
(WY)	(2003)	(2004)	(2004)	(2004)	(2004)	(2004)	(1978)	(1981)	(2002)	(2002)	(2002)	(2002)

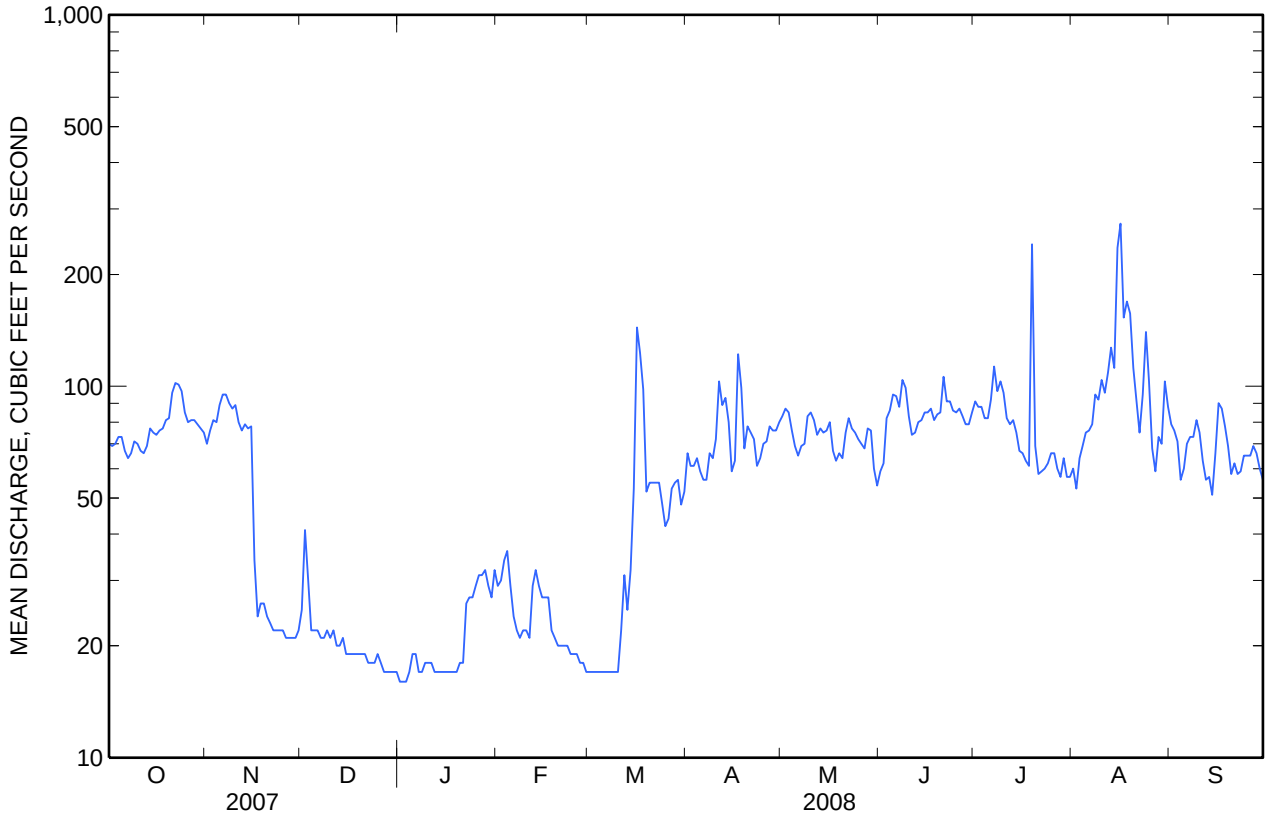
07121500 TIMPAS CREEK AT MOUTH NEAR SWINK, CO—Continued

SUMMARY STATISTICS

	Calendar Year 2007		Water Year 2008		Water Years 1922 - 2008	
Annual total	24,855		22,137			
Annual mean	68.1		60.5		61.8	
Highest annual mean					130	1923
Lowest annual mean					23.7	2002
Highest daily mean	207	Jun 27	274	Aug 16	2,670	Aug 17, 1923
Lowest daily mean	11	Mar 15	16	Jan 1	3.3	Aug 7, 1977
Annual seven-day minimum	12	Mar 9	17	Dec 28	4.9	Dec 1, 2003
Maximum peak flow			897	Jul 19	[a]12,300	Jul 10, 1978
Maximum peak stage			10.27	Jul 19	[b]21.11	Jul 10, 1978
Annual runoff (ac-ft)	49,300		43,910		44,800	
10 percent exceeds	117		95		119	
50 percent exceeds	77		66		48	
90 percent exceeds	13		18		14	

[a] From contracted-opening measurement of peak flow.

[b] From floodmark.



07124000 ARKANSAS RIVER AT LAS ANIMAS, CO

Upper Arkansas Basin
Upper Arkansas-John Martin Reservoir Subbasin

LOCATION.--Lat 38°04′51″, long 103°13′09″ referenced to North American Datum of 1927, in SE ¼ NE ¼ sec.3, T.23 S., R.52 W., Bent County, CO, Hydrologic Unit 11020009, on right bank at upstream side of bridge on U.S. Highway 50, 1.1 mi north of courthouse in Las Animas, and 4.2 mi upstream from Purgatoire River.

DRAINAGE AREA.--14,417 mi², of which 441 mi² probably is noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--May to November 1898 (gage heights only), August to November 1909 (gage heights and discharge measurements only), May 1939 to current year. Statistical summary computed for 1975 to current year, subsequent to partial regulation by Pueblo Reservoir.

REVISED RECORDS.--WSP 1341: Drainage area.

GAGE.--Water-stage recorder with satellite telemetry and crest-stage gage. Datum of gage is 3,883.97 ft above NGVD of 1929. May 13 to Nov. 12, 1898, and Aug. 1 to Nov. 10, 1909, nonrecording gages near present site at different datums. May 23, 1939 to Apr. 27, 1967, water-stage recorder at site 0.4 mi downstream at datum 9.00 ft lower.

REMARKS.--Records good except for estimated daily discharges, which are poor. Natural flow of stream affected by storage reservoirs, power developments, transbasin and transmountain diversions, diversions for irrigation and municipal use, ground-water withdrawals, return flows from irrigated areas, and flows from sewage-treatment plants. Flow partly regulated by Pueblo Reservoir (station 07099350) about 104 mi upstream since Jan. 9, 1974.

07124000 ARKANSAS RIVER AT LAS ANIMAS, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	68	126	160	145	123	118	35	319	478	629	455	257
2	62	96	163	e140	126	114	34	280	617	680	415	274
3	59	82	163	e150	134	112	34	238	574	856	347	242
4	59	82	156	147	138	114	34	209	482	992	295	218
5	60	82	155	145	140	113	33	190	573	911	266	196
6	60	79	163	145	124	111	31	162	946	641	298	193
7	132	71	152	141	124	112	26	130	1,080	760	229	196
8	369	66	149	135	124	111	25	100	926	608	198	172
9	404	62	141	135	121	115	23	104	745	488	333	154
10	413	60	143	138	121	120	25	340	439	616	538	139
11	429	54	155	138	121	179	26	508	e555	604	623	114
12	262	53	160	136	122	183	28	739	756	557	738	87
13	173	50	150	131	125	185	30	847	579	558	802	86
14	123	49	155	127	134	183	26	770	510	564	690	134
15	94	109	163	125	132	138	59	820	535	570	576	328
16	91	293	157	120	129	47	102	848	470	618	810	316
17	91	220	160	98	125	46	176	842	423	966	447	280
18	84	192	153	105	126	49	321	773	486	1,070	371	221
19	91	180	155	121	125	47	359	683	735	1,110	732	170
20	104	168	155	124	122	45	363	475	1,070	1,100	379	123
21	120	167	157	126	119	49	359	386	989	1,020	285	96
22	128	163	160	128	122	48	361	504	945	683	244	75
23	146	150	160	128	127	48	367	570	1,000	669	301	64
24	145	153	156	134	127	46	374	534	1,040	613	402	55
25	208	166	154	126	133	44	379	510	812	559	379	57
26	255	169	154	133	132	44	390	475	646	539	274	60
27	266	166	142	133	127	40	368	480	677	491	192	58
28	243	158	139	131	122	38	364	414	424	456	207	56
29	233	166	e135	133	119	41	363	482	266	440	218	56
30	238	161	e140	128	---	39	354	468	473	481	241	55
31	199	---	157	122	---	37	---	466	---	433	217	---
Total	5,409	3,793	4,762	4,068	3,664	2,716	5,469	14,666	20,251	21,282	12,502	4,532
Mean	174	126	154	131	126	87.6	182	473	675	687	403	151
Max	429	293	163	150	140	185	390	848	1,080	1,110	810	328
Min	59	49	135	98	119	37	23	100	266	433	192	55
Med	132	138	155	133	125	49	80	475	598	616	347	137
Ac-ft	10,730	7,520	9,450	8,070	7,270	5,390	10,850	29,090	40,170	42,210	24,800	8,990

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 2008, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	149	141	139	173	178	115	115	530	809	454	298	114
Max	1,092	810	398	641	761	422	877	4,043	4,263	3,339	1,343	373
(WY)	(1985)	(1998)	(1998)	(1998)	(1985)	(1998)	(1987)	(1999)	(1995)	(1995)	(1999)	(1984)
Min	5.13	6.05	8.40	8.45	18.5	9.44	10.8	14.1	16.8	10.0	14.5	9.12
(WY)	(1978)	(1975)	(1978)	(1978)	(1978)	(1975)	(1978)	(1981)	(2002)	(2002)	(2002)	(1977)

07124000 ARKANSAS RIVER AT LAS ANIMAS, CO—Continued

SUMMARY STATISTICS

	Calendar Year 2007		Water Year 2008		Water Years 1975 - 2008	
Annual total	102,834		103,114			
Annual mean	282		282		[a]268	
Highest annual mean					841	1995
Lowest annual mean					59.8	2002
Highest daily mean	1,780	May 27	1,110	Jul 19	[b]22,600	May 3, 1999
Lowest daily mean	31	Apr 6	23	Apr 9	[c]3.0	Nov 30, 1974
Annual seven-day minimum	35	Apr 3	26	Apr 7	4.1	Sep 26, 1977
Maximum peak flow			1,200	Jul 20	[d]32,900	May 2, 1999
Maximum peak stage			7.92	Jul 20	[f]14.02	May 2, 1999
Annual runoff (ac-ft)	204,000		204,500		194,500	
10 percent exceeds	648		678		543	
50 percent exceeds	163		160		115	
90 percent exceeds	62		56		17	

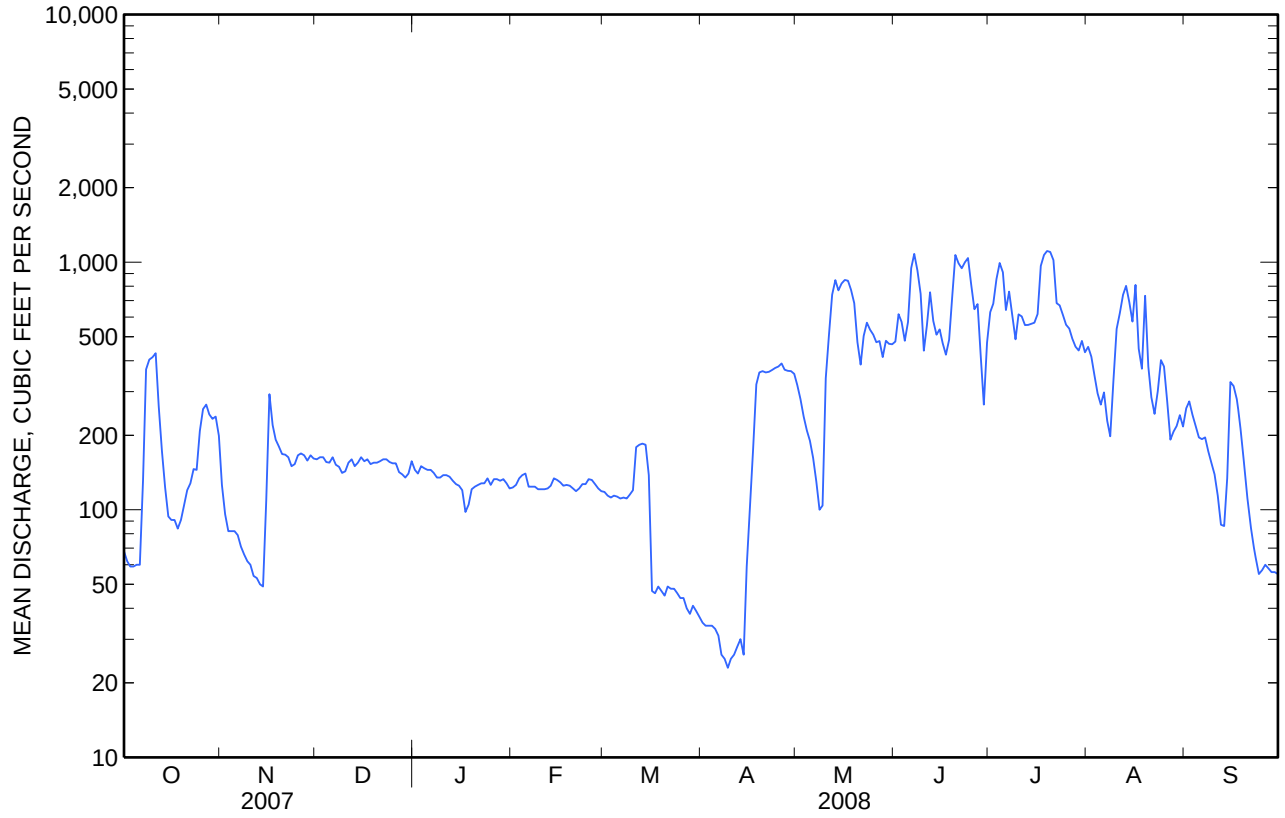
[a] Average discharge for 34 years (water years 1940-73), 203 ft³/s; 147,100 acre-ft/yr, prior to completion of Pueblo Dam.

[b] Maximum daily discharge for period of record, 25,800 ft³/s, May 20, 1955.

[c] Minimum daily discharge for period of record, 0.9 ft³/s, Jul 31, Aug 1 and 3, 1964.

[d] From rating curve extended above 21,600 ft³/s; maximum discharge and stage for period of record, 44,000 ft³/s, May 20, 1955, gage height, 15.03 ft, from current-meter measurement and slope-area measurement of over-flow channel, site and datum then in use.

[f] From floodmark.



07130500 ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, CO

Upper Arkansas Basin
Upper Arkansas-John Martin Reservoir Subbasin

LOCATION.--Lat 38°03′59″, long 102°55′55″ referenced to North American Datum of 1927, in NW ¼ NE ¼ sec.8, T.23 S., R.49 W., Bent County, CO, Hydrologic Unit 11020009, on right bank 0.2 mi downstream from John Martin Dam, 2.6 mi upstream from Caddoa Creek, and 3.5 mi southeast of Hasty.

DRAINAGE AREA.--18,915 mi^2, of which 785 mi^2 probably is noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--April 1938 to current year. Published as "at Caddoa" prior to October 1947. Statistical summary computed for 1949 to current year, subsequent to completion of John Martin Reservoir.

REVISED RECORDS.--WSP 1241: 1942 (M). WSP 1341: Drainage area.

GAGE.--Water-stage recorder with satellite telemetry, concrete control, and crest-stage gage. Datum of gage is 3,737.40 ft above NGVD of 1929. Prior to Feb. 22, 1940, at site 3 mi upstream at datum 22.83 ft higher. Feb. 22, 1940 to Feb. 4, 1943, at site 700 ft upstream at datum 3.64 ft higher. Feb. 5, 1943 to Apr. 8, 1975, at site 1.5 mi downstream at datum approximately 27.5 ft lower.

REMARKS.--Records good except for estimated daily discharges and those below 3 ft^3/s, which are poor. Natural flow of stream affected by storage reservoirs, power developments, transbasin and transmountain diversions, diversions for irrigation and municipal use, ground-water withdrawals, return flows from irrigated areas, and flows from sewage-treatment plants. Flow completely regulated by John Martin Reservoir (station 07130000) 0.2 mi upstream since Oct. 1948.

07130500 ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	372	19	0.62	e0.84	2.1	1.1	81	539	631	1,170	424	443
2	355	14	0.62	e0.85	0.86	0.96	80	543	632	1,210	433	418
3	346	14	0.64	e0.66	0.96	0.95	81	545	636	1,210	433	425
4	356	12	0.65	0.89	1.0	0.99	80	544	635	1,190	432	436
5	360	5.7	0.70	0.97	1.1	0.98	80	554	635	1,290	430	454
6	359	1.1	0.71	1.0	1.0	1.0	80	559	732	1,340	328	458
7	358	0.87	0.71	0.95	1.0	1.00	108	558	886	1,420	266	439
8	357	0.84	0.65	0.97	1.1	1.0	218	554	944	1,440	267	433
9	356	0.83	0.62	0.97	1.0	1.0	303	548	835	1,390	265	431
10	326	0.81	0.60	1.0	0.94	1.1	312	516	603	1,260	265	356
11	308	0.80	0.66	0.99	0.92	0.81	306	507	500	1,200	291	286
12	310	0.74	0.59	0.96	0.96	0.60	306	500	526	1,210	361	280
13	307	0.76	0.60	0.97	0.98	0.61	308	496	582	1,190	423	280
14	282	0.70	0.60	0.93	0.91	0.64	321	498	599	1,170	434	279
15	249	0.71	0.61	0.92	1.0	0.59	447	497	601	1,090	431	278
16	201	0.74	e0.62	0.89	0.97	0.54	504	496	617	1,050	378	277
17	174	0.73	e0.67	0.91	0.88	0.71	498	498	640	1,100	166	277
18	174	0.70	e0.71	0.88	0.97	0.82	487	499	641	1,110	51	277
19	112	0.68	0.95	1.0	1.0	0.92	489	497	640	1,110	200	278
20	68	0.68	0.90	1.0	0.92	0.94	489	495	638	1,110	344	277
21	68	0.63	e0.92	0.93	1.0	0.96	536	496	639	1,110	355	278
22	143	0.62	0.93	0.90	1.0	0.94	554	496	685	1,110	375	278
23	202	0.70	0.93	0.90	0.99	0.96	540	501	765	1,090	406	276
24	222	0.63	0.80	0.88	0.96	96	539	507	865	786	422	285
25	252	0.68	0.83	0.93	0.89	102	538	506	867	784	467	186
26	295	0.61	e0.82	1.0	0.99	69	537	506	841	782	494	93
27	311	0.66	e0.87	1.0	0.99	77	537	529	1,120	675	482	71
28	311	0.64	0.86	1.6	0.92	81	536	573	1,320	548	474	71
29	311	0.61	0.84	1.0	1.1	81	535	580	1,240	480	477	84
30	331	0.59	e0.82	1.00	---	81	534	608	1,160	448	478	97
31	346	---	0.79	0.92	---	81	---	630	---	434	477	---
Total	8,522	82.76	22.84	29.61	29.41	688.12	10,964	16,375	22,655	32,507	11,529	8,801
Mean	275	2.76	0.74	0.96	1.01	22.2	365	528	755	1,049	372	293
Max	372	19	0.95	1.6	2.1	102	554	630	1,320	1,440	494	458
Min	68	0.59	0.59	0.66	0.86	0.54	80	495	500	434	51	71
Ac-ft	16,900	164	45	59	58	1,360	21,750	32,480	44,940	64,480	22,870	17,460

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1949 - 2008, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	195	23.6	15.3	17.9	21.1	50.9	408	484	601	702	541	314
Max	565	217	317	725	477	498	1,174	2,576	2,665	2,895	2,127	1,007
(WY)	(1949)	(1966)	(1998)	(1998)	(1966)	(1998)	(1987)	(1987)	(1987)	(1995)	(1965)	(1984)
Min	11.4	0.85	0.64	0.62	0.75	1.06	2.43	34.2	52.0	86.1	22.6	6.69
(WY)	(1975)	(1977)	(1977)	(1977)	(1977)	(1980)	(1973)	(1975)	(1954)	(1963)	(1960)	(1974)

07130500 ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, CO—Continued

SUMMARY STATISTICS

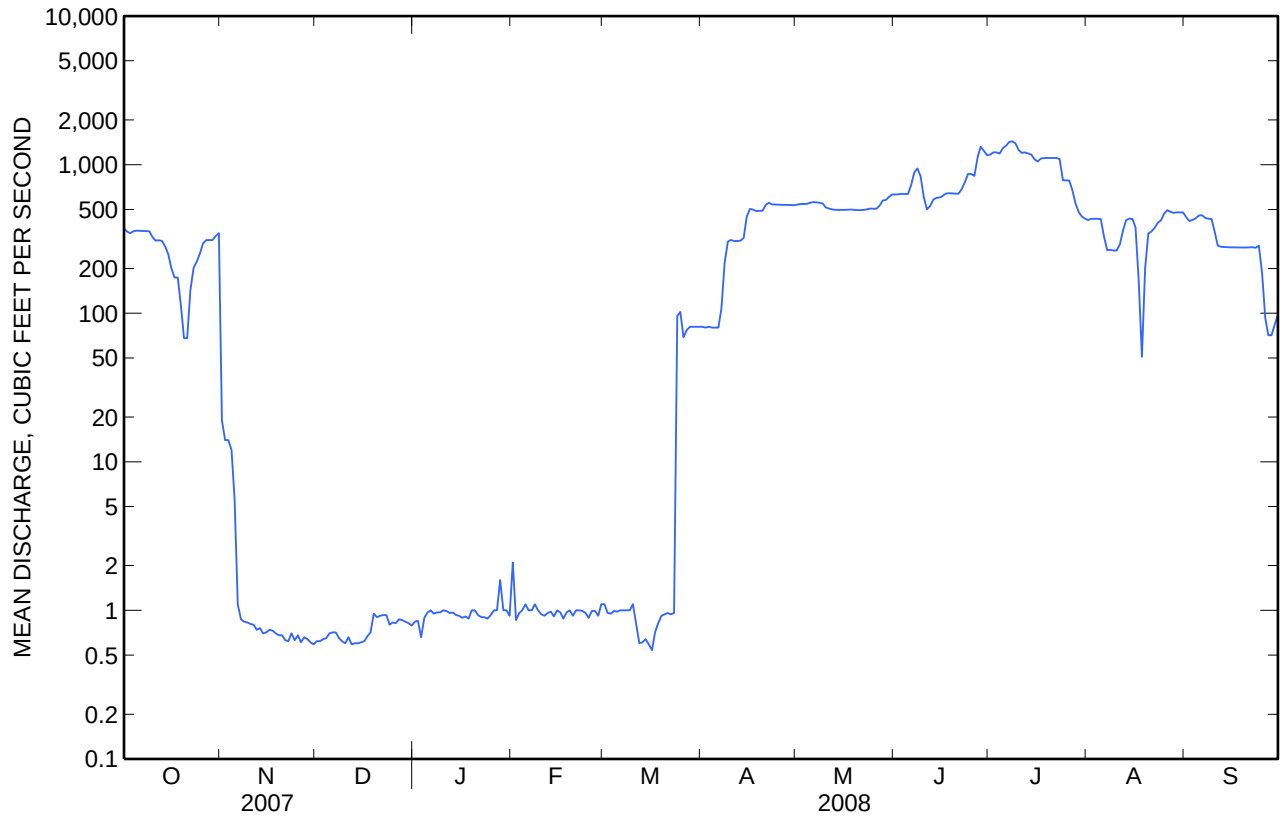
	Calendar Year 2007		Water Year 2008		Water Years 1949 - 2008	
Annual total	115,856.05		112,205.74			
Annual mean	317		307		[a]282	
Highest annual mean					745	1987
Lowest annual mean					82.5	1964
Highest daily mean	1,400	Jun 28	1,440	Jul 8	3,830	Aug 25, 1965
Lowest daily mean	0.43	Jan 1	0.54	Mar 16	[b]0.36	Dec 25, 1979
Annual seven-day minimum	0.45	Jan 1	0.61	Dec 9	0.36	Dec 25, 1979
Maximum peak flow			1,500	Jul 7	[c]4,100	Aug 25, 1965
Maximum peak stage			4.42	Jul 7	[d]5.75	Aug 25, 1965
Annual runoff (ac-ft)	229,800		222,600		204,600	
10 percent exceeds	807		770		856	
50 percent exceeds	68		266		58	
90 percent exceeds	0.62		0.71		1.8	

[a] Average discharge for 5 years (water years 1939-43), 628 ft³/s; 455,000 acre-ft/yr, prior to start of storage in John Martin Reservoir.

[b] Also occurred Dec 26, 1979 to Jan 3, 1980; no flow on many days during 1945-47. Minimum daily discharge prior to start of storage in John Martin Reservoir, 5 ft³/s, Jul 16, 1939.

[c] Maximum discharge for period of record, 40,000 ft³/s, Apr 24, 1942, from rating curve extended above 12,000 ft³/s on basis of flow-over-dam and critical-depth measurement of peak flow, gage height, 10.46 ft, site and datum then in use.

[d] Maximum gage height for period of record, 10.62 ft, Jun 18, 1965 (backwater from Caddoa Creek), site and datum then in use.



Water-Data Report 2008

07133000 ARKANSAS RIVER AT LAMAR, CO

Upper Arkansas Basin
Upper Arkansas-John Martin Reservoir Subbasin

LOCATION.--Lat 38°06′21″, long 102°37′05″ referenced to North American Datum of 1927, in NE ¼ SE ¼ sec.30, T.22 S., R.46 W., Prowers County, CO, Hydrologic Unit 11020009, on left bank at left downstream end of downstream bridge on U.S. Highways 50 and 287, and 1.3 mi north of courthouse in Lamar.

DRAINAGE AREA.--19,780 mi², of which 950 mi² probably is noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--May 1913 to September 1955, April 1959 to current year. Monthly discharge only for some periods, published in WSP 1311. Statistical summary computed for 1949 to current year, subsequent to completion of John Martin Reservoir.

REVISED RECORDS.--WSP 1341: 1921 (M), 1945-46 (M), drainage area; WDR CO-86-1: 1985.

GAGE.--Water-stage recorder with satellite telemetry and crest-stage gage. Datum of gage is 3,597.39 ft above NGVD of 1929. See WSP 1731 for history of changes prior to Apr. 4, 1959. Apr. 4, 1959 to Mar. 26, 1968, at site 525 ft upstream at datum 2.42 ft higher. Mar. 27, 1968 to Nov. 17, 1982, at site 375 ft downstream at datum 4.00 ft lower. Mar. 18, 1987 to Mar. 6, 2002, at site 75 ft upstream at same datum.

REMARKS.--No estimated daily discharges. Records good. Natural flow of stream affected by storage reservoirs, power developments, transbasin and transmountain diversions, diversions for irrigation and municipal use, ground-water withdrawals, return flows from irrigated areas, and flows from sewage-treatment plants. Flow regulated by John Martin Reservoir (station 07130000) 21 mi upstream since Oct. 1948.

07133000 ARKANSAS RIVER AT LAMAR, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	19	17	21	21	13	19	13	13	102	595	25	20
2	18	15	19	22	14	17	13	13	102	644	21	20
3	20	16	12	23	14	13	13	14	93	689	19	20
4	19	16	12	24	15	14	13	14	79	669	18	20
5	20	16	12	25	16	13	13	14	77	675	18	19
6	19	15	12	26	15	15	12	13	89	722	20	29
7	21	15	12	25	16	15	12	14	99	741	34	24
8	21	15	12	26	22	14	12	13	80	720	25	22
9	21	15	12	27	20	15	12	14	77	655	18	22
10	21	16	13	26	20	14	13	15	62	720	17	21
11	21	18	16	25	19	12	12	15	34	729	17	20
12	21	16	20	26	22	10	12	15	25	729	16	21
13	22	15	20	26	24	11	12	14	41	724	21	20
14	21	17	20	25	24	11	12	15	72	732	17	19
15	21	17	21	24	23	12	13	17	68	683	24	19
16	23	16	16	25	23	13	12	17	75	592	17	19
17	26	16	14	21	22	12	13	15	99	589	117	19
18	23	16	13	21	22	11	13	15	105	638	28	20
19	22	15	13	20	21	11	13	15	95	634	25	19
20	28	15	13	21	21	9.3	14	17	87	626	23	18
21	24	15	14	21	21	9.6	14	18	85	621	22	18
22	23	14	19	21	20	10	13	17	91	619	20	18
23	24	14	19	21	21	12	13	17	75	629	20	17
24	28	13	20	19	20	10	14	18	76	251	21	17
25	32	13	18	13	20	9.8	14	18	67	158	22	21
26	35	13	22	13	20	9.8	13	18	82	144	21	21
27	26	13	24	13	20	11	13	19	124	137	20	17
28	20	13	23	14	19	11	13	51	450	132	20	17
29	19	12	23	13	20	12	12	61	519	56	20	16
30	18	14	24	12	---	12	12	65	601	50	20	16
31	17	---	24	13	---	12	---	101	---	41	19	---
Total	693	451	533	652	567	380.5	383	695	3,731	16,344	745	589
Mean	22.4	15.0	17.2	21.0	19.6	12.3	12.8	22.4	124	527	24.0	19.6
Max	35	18	24	27	24	19	14	101	601	741	117	29
Min	17	12	12	12	13	9.3	12	13	25	41	16	16
Ac-ft	1,370	895	1,060	1,290	1,120	755	760	1,380	7,400	32,420	1,480	1,170

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1949 - 2008, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	36.2	21.0	28.2	37.5	38.6	40.0	154	186	267	314	201	83.4
Max	233	117	350	796	507	516	1,089	2,143	2,087	2,457	1,547	689
(WY)	(1949)	(1998)	(1998)	(1998)	(1966)	(1998)	(1987)	(1987)	(1987)	(1995)	(1965)	(1965)
Min	0.84	1.81	0.56	0.47	0.72	1.11	5.90	6.41	3.80	10.2	10.9	1.37
(WY)	(1978)	(1978)	(1978)	(1978)	(1965)	(1965)	(1995)	(1963)	(1954)	(1964)	(1974)	(1974)

07133000 ARKANSAS RIVER AT LAMAR, CO—Continued

SUMMARY STATISTICS

	Calendar Year 2007		Water Year 2008		Water Years 1949 - 2008	
Annual total	29,440.3		25,763.5			
Annual mean	80.7		70.4		[a]117	
Highest annual mean					537	1987
Lowest annual mean					17.7	2003
Highest daily mean	807	Jun 28	741	Jul 7	[b]25,000	Jun 18, 1965
Lowest daily mean	9.3	Jan 1	9.3	Mar 20	[c]0.00	Dec 5, 1953
Annual seven-day minimum	12	Dec 3	10	Mar 20	0.21	Jan 10, 1965
Maximum peak flow			802	Jul 7	[d]73,800	Jun 18, 1965
Maximum peak stage			7.80	Jul 7	[f]16.48	Jun 18, 1965
Annual runoff (ac-ft)	58,390		51,100		84,840	
10 percent exceeds	152		101		400	
50 percent exceeds	22		19		22	
90 percent exceeds	14		12		4.5	

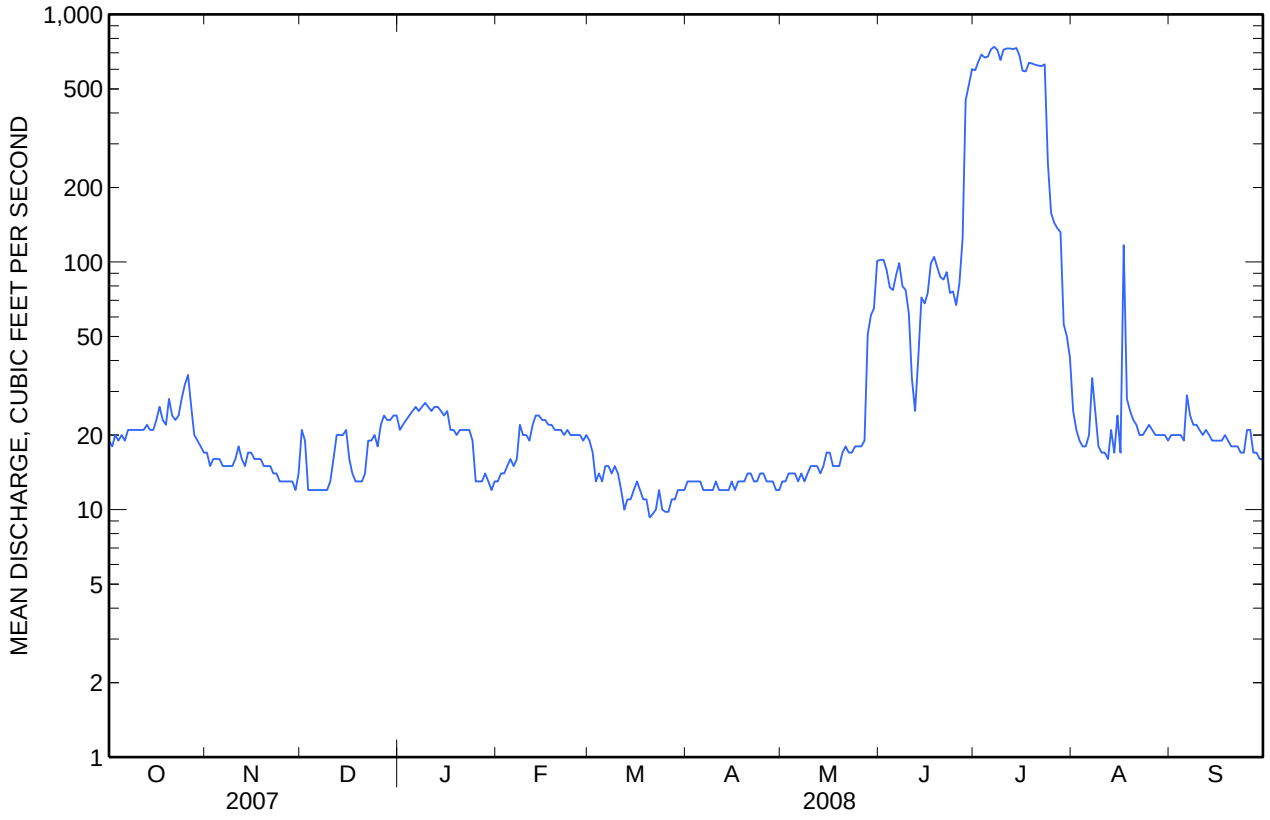
[a] Average discharge for 30 years (water years 1914-43), 298 ft³/s, 215,900 acre-ft/yr, prior to and during construction of John Martin Dam.

[b] Maximum daily discharge for period of record, 87,300 ft³/s, Jun 5, 1921.

[c] Also minimum daily discharge for period of record; also occurred at times in 1913-15.

[d] From current-meter and timed-drift measurement of peak flow, maximum discharge and gage height for period of record, 130,000 ft³/s, (determined by Colorado State Engineer) Jun 5, 1921, from rating curve extended above 10,000 ft³/s, gage height, 14.55 ft, site and datum then in use.

[f] From floodmarks, site and datum then in use.



Water-Data Report 2008

07134100 BIG SANDY CREEK NEAR LAMAR, CO

Upper Arkansas Basin
Big Sandy Subbasin

LOCATION.--Lat 38°06′51″, long 102°29′00″ referenced to North American Datum of 1927, in SW ¼ SW ¼ sec.21, T.22 S., R.45 W., Prowers County, CO, Hydrologic Unit 11020011, on right bank 35 ft upstream from State Highway 196, 950 ft upstream from mouth, and 7.5 mi east of Lamar.

DRAINAGE AREA.--3,248 mi^2, of which 585 mi^2 probably is noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--February 1968 to September 1982, July 1995 to current year.

REVISED RECORDS.--WDR CO-01-1: Drainage area.

GAGE.--Water-stage recorder with satellite telemetry and crest-stage gage. Elevation of gage is 3,545 ft above NGVD of 1929, from topographic map. Prior to June 30, 1977, at datum 1.00 ft higher.

REMARKS.--Records poor. Natural flow of stream affected by storage, erosion-control, and livestock-watering reservoirs, diversions for irrigation, ground-water withdrawals, and return flows from irrigated areas. Flow affected by backwater from the Arkansas River at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 17, 1965, reached a discharge of 3,600 ft^3/s, from slope-area measurement of peak flow 0.5 mi upstream from station. Flood of Aug. 21, 1965, reached a stage of 9.93 ft, from floodmarks, discharge unknown.

07134100 BIG SANDY CREEK NEAR LAMAR, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	e16	e18	e17	e15	e14	e11	e12	e9.0	e10	9.6	10	18
2	e16	e18	e17	e15	e14	e11	e11	e9.0	e10	9.4	9.3	19
3	e16	e18	e17	e15	e13	e11	e10	e9.0	e10	11	7.7	21
4	e16	e18	e16	e15	e13	e10	e9.0	e8.5	e10	12	7.6	20
5	e16	e18	e16	e15	e13	e9.0	e8.5	e8.5	e10	12	6.5	15
6	e16	e18	e16	e15	e13	e9.0	e8.5	e8.5	e10	14	6.2	19
7	e15	e18	e16	e15	e13	e9.0	e8.0	e9.0	e9.5	12	8.8	23
8	e15	e18	e16	e15	e13	e8.5	e8.0	e10	e9.5	16	11	23
9	e15	e18	e16	e15	e13	e8.5	e8.0	e12	e10	21	14	23
10	e15	e18	e16	e15	e13	e8.5	e10	e10	e9.5	20	13	22
11	e16	e18	e16	e15	e13	e8.5	e12	e10	e9.5	18	11	19
12	e16	e18	e16	e15	e12	e8.5	e12	e10	e10	18	11	16
13	e15	e18	e16	e15	e12	e8.0	e11	e10	e11	19	13	17
14	e16	e17	e16	e15	e12	e8.0	e11	e12	e10	15	11	15
15	e16	e17	e16	e15	e12	e8.0	e10	e11	e10	14	37	15
16	e16	e17	e16	e15	e12	e7.5	e10	e10	e10	9.3	32	14
17	e16	e17	e16	e14	e12	e7.5	e12	e10	e9.5	13	35	15
18	e16	e17	e16	e14	e12	e7.5	e12	e10	e9.5	11	31	13
19	e16	e17	e15	e14	e12	e7.5	e10	e10	7.5	6.7	26	15
20	e16	e17	e15	e14	e12	e7.5	e10	e10	5.7	6.1	23	11
21	e17	e17	e15	e14	e11	e7.5	e10	e10	5.6	6.5	23	13
22	e18	e17	e15	e14	e11	e7.5	e10	e10	5.0	6.8	21	16
23	e18	e17	e15	e14	e11	e7.5	e10	e10	6.3	8.6	21	14
24	e18	e17	e15	e14	e11	e7.5	e10	e10	6.9	9.2	20	9.9
25	e18	e17	e15	e14	e11	e7.5	e10	e10	7.1	10	20	8.8
26	e18	e17	e15	e14	e11	e9.0	e10	e10	7.0	10	20	9.5
27	e18	e17	e15	e14	e11	e14	e10	e10	9.9	10	21	9.1
28	e18	e17	e15	e14	e11	e13	e10	e10	13	9.3	21	e10
29	e18	e17	e15	e14	e11	e12	e10	e10	19	9.8	19	e10
30	e18	e17	e15	e14	---	e12	e10	e9.0	9.4	13	14	e10
31	e18	---	e15	e14	---	e12	---	e8.0	---	10	16	---
Total	512	523	486	450	352	283.5	303.0	303.5	280.4	370.3	540.1	463.3
Mean	16.5	17.4	15.7	14.5	12.1	9.15	10.1	9.79	9.35	11.9	17.4	15.4
Max	18	18	17	15	14	14	12	12	19	21	37	23
Min	15	17	15	14	11	7.5	8.0	8.0	5.0	6.1	6.2	8.8
Ac-ft	1,020	1,040	964	893	698	562	601	602	556	734	1,070	919

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 2008, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	8.17	13.9	17.9	19.1	18.9	19.3	18.3	19.3	10.8	9.84	13.6	9.62
Max	28.4	58.9	63.0	75.5	55.6	59.0	70.6	166	42.9	41.6	85.3	41.8
(WY)	(1997)	(1998)	(1998)	(1998)	(1998)	(1998)	(1999)	(1999)	(1999)	(1998)	(1997)	(1976)
Min	0.09	0.41	0.34	0.50	2.23	2.10	0.81	2.14	1.77	0.21	0.03	0.08
(WY)	(1979)	(1978)	(1978)	(1978)	(1978)	(1977)	(1978)	(1975)	(1976)	(1978)	(1976)	(1978)

07134100 BIG SANDY CREEK NEAR LAMAR, CO—Continued

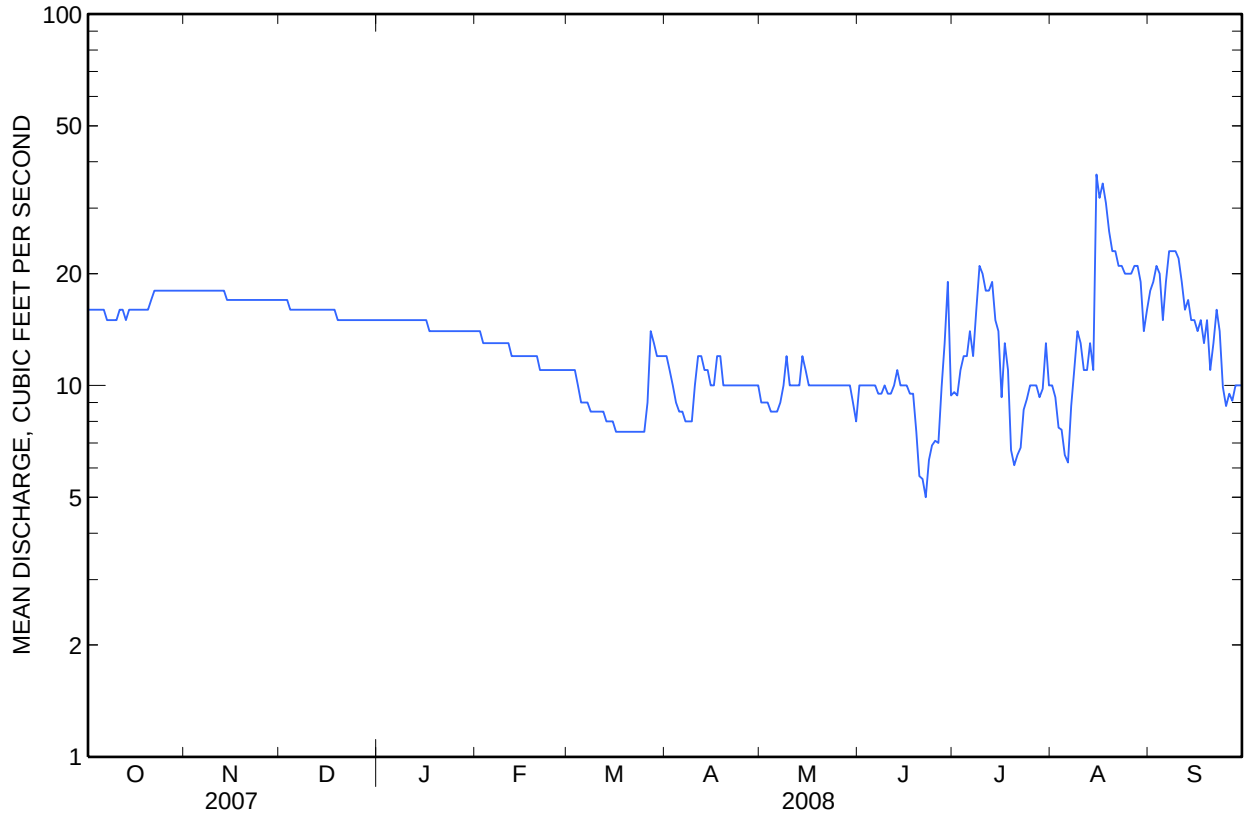
SUMMARY STATISTICS

	Calendar Year 2007		Water Year 2008		Water Years 1968 - 2008	
Annual total	4,957.7		4,867.1			
Annual mean	13.6		13.3		15.1	
Highest annual mean					45.6	1999
Lowest annual mean					2.23	1979
Highest daily mean	54	Apr 22	37	Aug 15	1,460	May 4, 1999
Lowest daily mean	5.0	Jan 1	5.0	Jun 22	[a]0.00	Aug 13, 1976
Annual seven-day minimum	5.0	Jan 1	6.2	Jun 20	0.00	Sep 1, 1976
Maximum peak flow			107	Aug 15	[b]2,850	May 4, 1999
Maximum peak stage			[c]3.33	Aug 15	9.66	May 4, 1999
Annual runoff (ac-ft)	9,830		9,650		10,910	
10 percent exceeds	19		18		39	
50 percent exceeds	15		13		8.2	
90 percent exceeds	5.0		8.5		1.2	

[a] Also occurred on many days during 1976-79 water years.

[b] From rating curve extended above 1,470 ft³/s on basis of flow through culvert analysis with flow over road measurement at gage height 9.48 ft.

[c] Maximum gage height, 4.93 ft, Dec 12, backwater from beaver dam.



Water-Data Report 2008

07134990 WILD HORSE CREEK ABOVE HOLLY, CO

Upper Arkansas Basin
Upper Arkansas-John Martin Reservoir Subbasin

LOCATION.--Lat 38°03′24″, long 102°08′16″ referenced to North American Datum of 1927, in NE ¼ NE ¼ sec.16, T.23 S., R.42 W., Prowers County, CO, Hydrologic Unit 11020009, on left bank 1,000 ft downstream from County Road No. 34, 0.7 mi northwest of Holly, and 0.7 mi upstream from mouth.

DRAINAGE AREA.--270 mi², of which 60 mi² probably is noncontributing (total area is approximate).

SURFACE-WATER RECORDS

PERIOD OF RECORD.--June 1995 to current year (seasonal records only).

REVISED RECORDS.--WDR CO-01-1: Drainage area.

GAGE.--Water-stage recorder with satellite telemetry and crest-stage gage. Elevation of gage is 3,405 ft above NGVD of 1929, from topographic map. Prior to Apr. 29, 1997, at site 1,050 ft upstream at datum 3.00 ft higher.

REMARKS.--No estimated daily discharges. Records fair except for those below 1.0 ft³/s, which are poor. Natural flow of stream affected by diversions for irrigation, ground-water withdrawals, and return flows from irrigated areas, the Buffalo Canal, and the Amity Canal.

EXTREMES FOR PERIOD OF RECORD.--(seasonal only) Maximum discharge, 1,270 ft³/s, May 26, 1996, from slope-area measurement of peak flow, gage height, 6.90 ft, from floodmark, site and datum then in use; maximum gage height, 8.63 ft, Aug. 7, 1997, from floodmark; no flow on many days during many years.

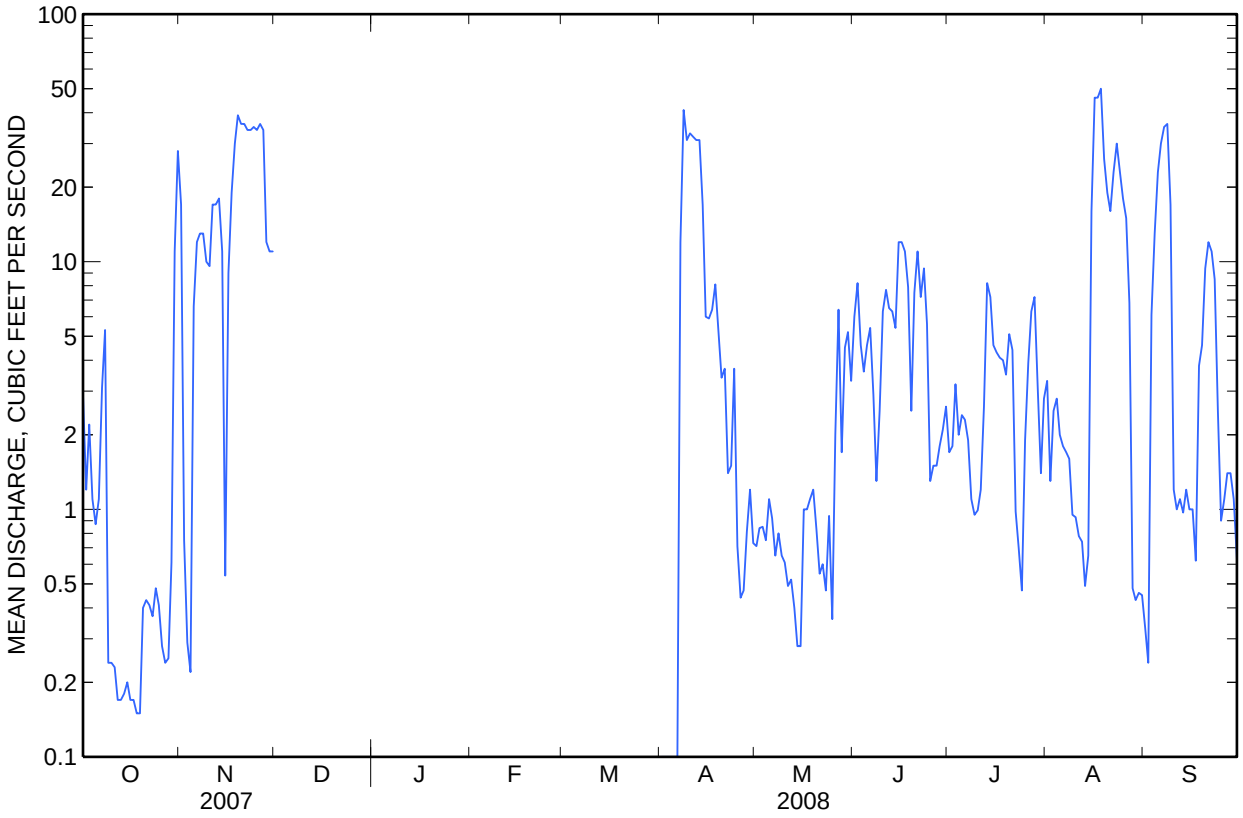
EXTREMES FOR CURRENT YEAR.--(seasonal only) Maximum discharge, 77 ft³/s, Aug. 18, gage height, 3.79 ft; no flow on many days.

07134990 WILD HORSE CREEK ABOVE HOLLY, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.9	17	---	---	---	---	0.00	0.71	6.0	1.7	3.3	0.33
2	1.2	0.75	---	---	---	---	0.00	0.84	8.2	1.8	1.3	0.24
3	2.2	0.29	---	---	---	---	0.00	0.85	4.6	3.2	2.5	6.1
4	1.1	0.22	---	---	---	---	0.00	0.75	3.6	2.0	2.8	13
5	0.87	6.6	---	---	---	---	0.00	1.1	4.6	2.4	2.0	23
6	1.1	12	---	---	---	---	0.00	0.92	5.4	2.3	1.8	30
7	3.1	13	---	---	---	---	12	0.65	2.9	1.9	1.7	35
8	5.3	13	---	---	---	---	41	0.80	1.3	1.1	1.6	36
9	0.24	10	---	---	---	---	31	0.65	2.5	0.95	0.95	17
10	0.24	9.6	---	---	---	---	33	0.61	6.3	0.99	0.93	1.2
11	0.23	17	---	---	---	---	32	0.49	7.7	1.2	0.78	1.0
12	0.17	17	---	---	---	---	31	0.52	6.5	2.6	0.74	1.1
13	0.17	18	---	---	---	---	31	0.40	6.3	8.2	0.49	0.97
14	0.18	11	---	---	---	---	17	0.28	5.4	7.2	0.65	1.2
15	0.20	0.54	---	---	---	---	6.0	0.28	12	4.6	16	1.0
16	0.17	9.0	---	---	---	---	5.9	1.0	12	4.3	46	1.0
17	0.17	19	---	---	---	---	6.4	1.00	11	4.1	46	0.62
18	0.15	30	---	---	---	---	8.1	1.1	7.9	4.0	50	3.8
19	0.15	39	---	---	---	---	5.3	1.2	2.5	3.5	26	4.6
20	0.40	36	---	---	---	---	3.4	0.83	7.5	5.1	19	9.4
21	0.43	36	---	---	---	---	3.7	0.55	11	4.4	16	12
22	0.41	34	---	---	---	---	1.4	0.60	7.2	0.98	23	11
23	0.37	34	---	---	---	---	1.5	0.47	9.4	0.70	30	8.5
24	0.48	35	---	---	---	---	3.7	0.94	5.6	0.47	23	2.5
25	0.41	34	---	---	---	---	0.71	0.36	1.3	1.9	18	0.90
26	0.28	36	---	---	---	---	0.44	2.0	1.5	3.9	15	1.1
27	0.24	34	---	---	---	---	0.47	6.4	1.5	6.3	6.8	1.4
28	0.25	12	---	---	---	---	0.81	1.7	1.8	7.2	0.48	1.4
29	0.61	11	---	---	---	---	1.2	4.5	2.1	3.1	0.43	1.1
30	11	11	---	---	---	---	0.73	5.2	2.6	1.4	0.46	0.63
31	28	---	---	---	---	---	---	3.3	---	2.8	0.45	---
Total	62.72	556.00	---	---	---	---	277.76	41.00	168.2	96.29	358.16	227.09
Mean	2.02	18.5	---	---	---	---	9.26	1.32	5.61	3.11	11.6	7.57
Max	28	39	---	---	---	---	41	6.4	12	8.2	50	36
Min	0.15	0.22	---	---	---	---	0.00	0.28	1.3	0.47	0.43	0.24
Ac-ft	124	1,100	---	---	---	---	551	81	334	191	710	450

07134990 WILD HORSE CREEK ABOVE HOLLY, CO—Continued



07137500 ARKANSAS RIVER NEAR COOLIDGE, KS

Middle Arkansas Basin
Middle Arkansas-Lake McKinney Subbasin

LOCATION.--Lat 38°01′39″, long 102°00′40″ referenced to North American Datum of 1927, in NE ¼ NE ¼ NW ¼ sec.26, T.23 S., R.43 W., Hamilton County, KS, Hydrologic Unit 11030001, on right bank at downstream side of county highway bridge, 1.0 mi south of Coolidge, 1.9 mi downstream from Colorado-Kansas State line, and at mile 1,099.3 .

DRAINAGE AREA.--25,410 mi² of which 1,708 mi² probably is noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--May to October 1903, March to May 1921, October 1950 to current year. Monthly discharge only for some periods, published in WSP 1311.

REVISED RECORDS.--WSP 1341: 1903, drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,330.84 ft above NGVD of 1929. May 5 to Oct. 31, 1903, nonrecording gage, and Mar. 1 to May 31, 1921, water-stage recorder at present site at different datum. Oct. 1, 1950, to Mar. 31, 1966, water-stage recorder at site 0.3 mi upstream at datum 3.00 ft higher.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Combined flow of river and Frontier Ditch (station 07137000) represents entire flow that enters Kansas. Flow regulated since 1948 by John Martin Reservoir (station 07130000). Natural flow of stream affected by transmountain diversions, storage reservoirs, power developments, ground-water withdrawals and diversions for irrigation of about 500,000 acres, and return flow from irrigated areas. Satellite telemeter at station.

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	80	103	119	e117	104	102	97	63	58	356	136	148
2	71	109	120	e117	103	104	95	71	72	383	115	145
3	74	96	118	e117	105	106	95	81	73	436	107	140
4	71	88	118	117	106	103	93	85	77	477	102	131
5	74	88	116	116	107	99	105	75	78	500	93	130
6	74	81	116	118	107	97	103	75	79	525	90	130
7	75	81	115	118	108	97	99	71	75	581	97	135
8	78	81	115	118	108	98	101	75	80	610	113	125
9	75	77	115	118	107	97	97	67	93	623	113	116
10	76	69	116	117	106	97	104	69	98	600	121	110
11	72	82	118	117	107	97	103	68	91	641	123	97
12	71	101	115	115	109	99	99	69	77	633	122	109
13	72	100	117	113	109	98	99	59	63	656	112	100
14	78	97	120	113	110	98	99	53	56	654	106	102
15	77	94	120	114	108	96	97	65	64	643	141	100
16	78	96	120	114	110	96	91	63	72	605	195	94
17	78	98	119	109	110	110	101	61	73	554	215	96
18	77	104	116	111	107	110	119	55	80	570	249	88
19	75	113	115	107	106	103	89	57	80	577	239	82
20	73	112	117	106	107	102	78	54	87	569	203	86
21	83	112	119	106	108	101	72	53	109	557	183	88
22	100	114	117	107	107	98	65	53	101	542	173	85
23	103	119	115	108	108	97	58	55	92	527	168	79
24	101	118	117	109	106	96	64	51	100	536	157	81
25	101	119	118	111	108	95	76	50	99	425	154	83
26	99	120	117	107	106	93	59	53	99	311	148	90
27	88	120	119	105	105	92	66	46	96	276	152	96
28	96	118	e119	107	104	92	70	44	103	257	151	95
29	100	117	e118	106	104	93	68	44	182	229	148	83
30	98	118	e118	105	---	97	66	51	294	184	151	72
31	97	---	e118	106	---	96	---	55	---	156	149	---
Mean	82.7	102	117	112	107	98.7	87.6	61.0	93.4	490	146	104
Max	103	120	120	118	110	110	119	85	294	656	249	148
Min	71	69	115	105	103	92	58	44	56	156	90	72
Ac-ft	5,090	6,040	7,220	6,880	6,150	6,070	5,210	3,750	5,560	30,140	8,980	6,180

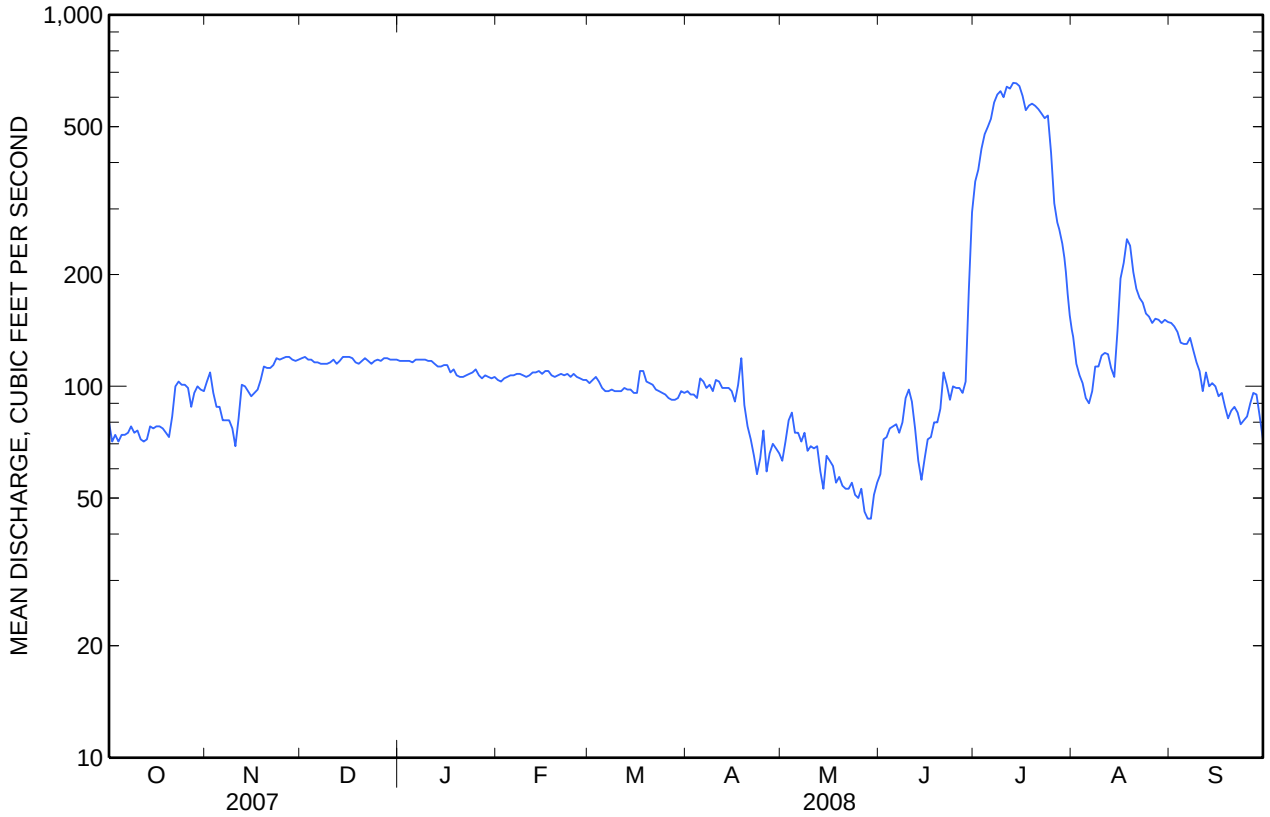
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 2008, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	128	118	123	129	135	131	207	300	456	358	309	170
Max	332	424	534	972	602	658	1,221	2,478	8,221	2,255	1,979	1,079
(WY)	(1998)	(1998)	(1998)	(1998)	(1966)	(1998)	(1987)	(1999)	(1965)	(1995)	(1965)	(1965)
Min	1.97	1.53	3.94	3.14	5.52	5.63	9.43	6.61	4.20	3.59	1.94	0.90
(WY)	(1979)	(1979)	(1979)	(1979)	(1978)	(1978)	(1979)	(1963)	(1954)	(1974)	(1964)	(1960)

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

SUMMARY STATISTICS

	Calendar Year 2007		Water Year 2008		Water Years 1951 - 2008	
Annual mean	173		134		214	
Highest annual mean					1,012	1965
Lowest annual mean					19.8	1979
Highest daily mean	686	Jul 13	656	Jul 13	101,000	Jun 18, 1965
Lowest daily mean	41	Jan 1	44	May 28	0.00	Jul 9, 1954
Annual seven-day minimum	59	Jan 1	48	May 24	0.00	Jul 9, 1954
Maximum peak flow			679	Jul 14	158,000	Jun 17, 1965
Maximum peak stage			5.05	Jul 14	14.80	Jun 17, 1965
Instantaneous low flow			41	May 29	0.00	many years
Annual runoff (ac-ft)	124,900		97,260		155,100	
10 percent exceeds	276		183		448	
50 percent exceeds	119		104		120	
90 percent exceeds	76		70		11	



07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964-68, 1970-73, 1975-81, July 1999 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1963 to September 1968, January 1976 to September 1981, October 2000 to current year.
WATER TEMPERATURE: November 1963 to September 1968, October 1976 to September 1981, July 1999 to current year.

INSTRUMENTATION.--Multiparameter water-quality monitor.

REMARKS.--Records good. Interruptions in record are due to ice conditions or malfunction of the recording instrument or sensors.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 6,800 miscrosiemens/cm, Mar. 29, 1978; minimum, 184 microsiemens/cm, Aug. 30, 2002.
WATER TEMPERATURE: Maximum, 36.4°C, Aug. 7, 2003; minimum, -0.2°C, Jan. 5, 2005.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 4,600 microsiemens/cm, Jan. 17; minimum, 1,570 microsiemens/cm, July 24.
WATER TEMPERATURE: Maximum, 30.6°C, June 25; minimum, -0.2°C, Dec. 16.

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		October			November			December			January	
1	4,000	3,940	3,970	3,950	3,750	3,820	4,270	4,200	4,240	---	---	---
2	4,100	4,000	4,050	3,990	3,770	3,830	4,260	4,210	4,230	---	---	---
3	4,080	3,990	4,020	4,190	3,970	4,060	4,260	4,200	4,230	4,480	4,290	4,380
4	4,140	4,050	4,100	4,240	4,190	4,210	4,250	4,220	4,230	4,330	4,240	4,280
5	4,120	4,060	4,090	4,240	4,220	4,230	4,300	4,220	4,240	4,280	4,230	4,260
6	4,110	4,020	4,070	4,310	4,210	4,260	4,260	4,230	4,240	4,250	4,220	4,240
7	4,060	4,000	4,030	4,320	4,210	4,280	4,270	4,240	4,250	4,250	4,210	4,230
8	4,050	3,880	3,990	4,290	4,210	4,260	4,300	4,270	4,280	4,270	4,200	4,230
9	4,080	4,020	4,050	4,290	4,260	4,270	4,340	4,270	4,310	4,260	4,210	4,230
10	4,080	3,990	4,050	4,300	4,260	4,280	4,300	4,200	4,270	4,270	4,210	4,240
11	4,120	4,040	4,090	4,290	4,180	4,240	4,230	4,190	4,210	4,270	4,220	4,240
12	4,140	4,090	4,110	4,220	4,180	4,210	4,300	4,220	4,270	4,270	4,210	4,240
13	4,170	4,100	4,140	4,260	4,220	4,250	4,320	4,250	4,290	4,290	4,220	4,250
14	4,170	4,110	4,140	4,410	4,240	4,290	4,300	4,260	4,280	4,300	4,230	4,260
15	4,170	4,070	4,130	4,380	4,310	4,350	4,310	4,260	4,290	4,300	4,230	4,260
16	4,130	4,060	4,090	4,390	4,270	4,340	4,420	4,270	4,340	4,300	4,240	4,270
17	4,220	4,100	4,170	4,340	4,230	4,300	4,340	4,270	4,310	4,600	4,300	4,430
18	4,260	4,220	4,240	4,290	4,260	4,270	4,350	4,280	4,310	4,370	4,220	4,300
19	4,240	4,200	4,220	4,260	4,220	4,240	4,310	4,270	4,290	4,280	4,230	4,260
20	4,300	4,200	4,250	4,260	4,230	4,250	4,320	4,260	4,280	4,320	4,240	4,270
21	4,310	4,020	4,220	4,300	4,250	4,260	4,310	4,270	4,280	4,340	4,270	4,310
22	4,020	3,860	3,900	4,320	4,230	4,280	4,320	4,270	4,300	4,460	4,280	4,350
23	3,950	3,850	3,890	4,270	4,220	4,250	4,460	4,280	4,360	4,420	4,290	4,350
24	4,050	3,950	4,000	4,310	4,210	4,260	4,360	4,250	4,300	4,440	4,300	4,350
25	4,080	3,970	4,020	4,320	4,220	4,260	4,310	4,270	4,290	4,350	4,270	4,310
26	4,010	3,920	3,980	4,290	4,230	4,250	4,320	4,250	4,280	4,330	4,250	4,290
27	3,960	3,850	3,900	4,310	4,230	4,260	4,320	4,220	4,280	4,340	4,270	4,300
28	3,910	3,760	3,830	4,300	4,180	4,220	---	---	---	4,320	4,270	4,300
29	3,840	3,770	3,790	4,280	4,220	4,240	---	---	---	4,350	4,300	4,320
30	3,960	3,840	3,910	4,260	4,220	4,240	---	---	---	4,360	4,260	4,310
31	3,950	3,900	3,920	---	---	---	---	---	---	4,350	4,250	4,290
Month	4,310	3,760	4,040	4,410	3,750	4,230	---	---	---	---	---	---

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		February			March			April			May	
1	4,360	4,250	4,290	4,270	4,230	4,250	4,230	4,130	4,170	4,170	4,110	4,130
2	4,300	4,220	4,260	4,260	4,240	4,250	4,260	4,190	4,230	4,190	4,050	4,110
3	4,280	4,220	4,240	4,280	4,200	4,240	4,260	4,200	4,220	4,240	3,600	3,980
4	4,260	4,210	4,230	4,300	4,240	4,260	4,330	4,190	4,260	4,170	3,650	3,990
5	4,230	4,130	4,170	4,270	4,220	4,250	4,370	4,240	4,290	4,170	3,970	4,050
6	4,350	4,150	4,220	4,270	4,200	4,230	4,320	4,260	4,290	4,030	3,880	3,960
7	4,250	4,170	4,200	4,260	4,190	4,230	4,470	4,280	4,310	4,020	3,860	3,950
8	4,220	4,170	4,200	4,250	4,180	4,220	4,500	4,230	4,300	3,960	3,800	3,880
9	4,240	4,160	4,200	4,230	4,180	4,210	4,280	4,220	4,250	4,080	3,840	3,940
10	4,240	4,200	4,230	4,240	4,200	4,220	4,300	3,890	4,070	4,120	4,020	4,080
11	4,260	4,190	4,230	4,240	4,200	4,220	4,180	4,080	4,140	4,130	4,090	4,110
12	4,230	4,170	4,200	4,260	4,220	4,240	4,200	4,140	4,170	4,170	4,110	4,140
13	4,240	4,160	4,200	4,250	4,210	4,230	4,240	4,160	4,190	4,290	4,150	4,230
14	4,240	4,210	4,230	4,240	4,210	4,230	4,370	4,180	4,220	4,410	4,280	4,360
15	4,280	4,190	4,230	4,250	4,210	4,230	4,360	4,240	4,270	4,390	4,250	4,310
16	4,250	4,180	4,210	4,280	4,240	4,260	4,330	4,180	4,270	4,320	4,100	4,180
17	4,230	4,190	4,210	4,240	3,730	3,990	4,190	3,910	4,030	4,280	4,110	4,200
18	4,270	4,180	4,230	4,230	3,770	4,120	4,000	3,620	3,820	4,340	4,220	4,260
19	4,260	4,180	4,220	4,280	4,220	4,240	4,040	3,850	3,920	4,340	4,190	4,260
20	4,250	4,200	4,230	4,300	4,250	4,270	4,080	3,990	4,030	4,250	4,150	4,190
21	4,280	4,210	4,240	4,330	4,280	4,300	4,140	4,020	4,090	4,290	4,200	4,250
22	4,260	4,180	4,220	4,330	4,300	4,320	4,170	4,030	4,090	4,270	4,200	4,230
23	4,230	4,180	4,210	4,330	4,290	4,310	4,170	4,040	4,110	4,240	4,110	4,160
24	4,240	4,190	4,220	4,320	4,280	4,300	4,150	3,740	3,950	4,270	4,110	4,210
25	4,250	4,200	4,220	4,340	4,300	4,320	4,080	3,780	3,940	4,250	4,120	4,190
26	4,260	4,220	4,240	4,350	4,280	4,320	4,200	3,860	4,110	4,230	3,980	4,120
27	4,280	4,210	4,250	4,300	4,260	4,280	4,140	4,000	4,100	4,260	4,160	4,220
28	4,280	4,230	4,250	4,280	4,220	4,240	4,120	4,000	4,040	4,330	4,210	4,270
29	4,280	4,230	4,250	4,240	4,170	4,210	4,120	3,980	4,070	4,400	4,230	4,330
30	---	---	---	4,200	4,130	4,150	4,110	4,000	4,040	4,250	3,910	4,030
31	---	---	---	4,180	4,130	4,160	---	---	---	4,020	3,820	3,870
Month	4,360	4,130	4,230	4,350	3,730	4,240	4,500	3,620	4,130	4,410	3,600	4,140

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		June			July			August			September	
1	3,820	3,530	3,740	2,150	2,010	2,090	3,410	3,170	3,260	3,290	3,140	3,240
2	3,530	3,450	3,490	2,040	1,940	2,000	3,520	3,290	3,400	3,150	3,110	3,130
3	3,570	3,440	3,520	1,940	1,850	1,890	3,770	3,480	3,630	3,240	3,090	3,140
4	3,530	3,430	3,490	1,910	1,830	1,870	3,780	3,590	3,690	3,540	3,240	3,430
5	3,570	3,490	3,520	1,860	1,820	1,840	3,670	3,540	3,600	3,560	3,470	3,510
6	3,670	3,520	3,590	1,850	1,810	1,830	3,750	3,590	3,700	3,580	3,470	3,530
7	3,670	3,600	3,640	1,820	1,720	1,790	3,790	3,410	3,590	3,540	3,470	3,510
8	3,640	3,340	3,490	1,810	1,760	1,790	3,590	3,350	3,470	3,480	3,330	3,400
9	3,340	3,240	3,270	1,810	1,770	1,800	3,780	3,500	3,640	3,700	3,420	3,490
10	3,290	3,200	3,260	1,860	1,760	1,820	3,940	3,700	3,830	3,710	3,520	3,590
11	3,380	3,230	3,330	1,770	1,730	1,750	3,880	3,720	3,790	3,840	3,670	3,740
12	3,770	3,320	3,550	1,790	1,740	1,770	3,950	3,690	3,860	3,740	3,500	3,610
13	3,910	3,740	3,830	1,780	1,750	1,760	4,030	3,870	3,940	3,820	3,600	3,700
14	3,990	3,870	3,950	1,750	1,730	1,740	3,910	3,670	3,810	3,820	3,660	3,720
15	3,870	3,650	3,790	1,770	1,690	1,710	3,670	3,120	3,370	3,900	3,660	3,780
16	3,650	3,520	3,560	1,740	1,700	1,720	3,400	2,810	2,980	3,960	3,660	3,820
17	3,580	3,510	3,550	1,790	1,710	1,750	3,170	3,040	3,130	4,060	3,720	3,890
18	3,510	3,380	3,460	1,770	1,710	1,740	3,340	2,760	3,180	4,060	3,790	3,920
19	3,450	3,400	3,430	1,730	1,690	1,710	3,360	2,660	2,940	4,170	3,850	4,000
20	3,420	3,180	3,370	1,750	1,700	1,730	3,780	3,360	3,590	4,070	3,730	3,910
21	3,350	3,030	3,200	1,770	1,710	1,730	3,980	3,770	3,880	4,060	3,820	3,940
22	3,440	3,330	3,360	1,740	1,680	1,710	3,970	3,910	3,940	4,160	3,860	4,000
23	3,540	3,330	3,450	1,680	1,620	1,650	3,930	3,830	3,870	4,170	3,910	4,040
24	3,530	3,260	3,360	1,700	1,570	1,650	3,850	3,760	3,820	---	---	---
25	3,460	3,270	3,340	2,200	1,590	1,980	3,760	3,670	3,710	---	---	---
26	3,460	3,320	3,380	2,290	2,200	2,250	3,720	3,580	3,670	---	---	---
27	3,400	3,310	3,360	2,380	2,280	2,340	3,580	3,350	3,460	---	---	---
28	3,330	3,180	3,240	2,460	2,310	2,380	3,360	3,300	3,330	---	---	---
29	3,180	2,310	2,620	2,570	2,460	2,500	3,350	3,290	3,320	---	---	---
30	2,350	2,140	2,220	3,030	2,570	2,840	3,340	3,270	3,290	---	---	---
31	---	---	---	3,250	3,030	3,160	3,340	3,250	3,290	---	---	---
Month	3,990	2,140	3,410	3,250	1,570	1,940	4,030	2,660	3,550	---	---	---

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		October			November			December			January	
1	19.4	13.3	16.6	12.2	6.7	9.3	8.9	2.2	5.1	---	---	---
2	21.2	15.7	18.1	11.5	6.9	9.2	7.1	3.2	5.1	0.7	-0.2	---
3	20.2	12.1	16.0	12.4	5.9	9.1	7.6	2.2	4.9	1.7	-0.2	0.4
4	22.2	13.4	17.5	12.6	6.0	9.2	9.2	4.2	6.6	4.8	-0.1	2.1
5	22.7	15.3	18.8	11.8	6.6	9.1	9.7	6.0	7.6	5.7	1.8	3.7
6	23.7	16.4	19.7	10.7	4.8	7.7	8.7	4.6	6.6	5.7	3.6	4.7
7	19.6	14.3	16.9	11.8	4.5	8.1	7.5	4.2	5.5	5.9	2.8	4.4
8	19.2	11.4	15.2	12.3	5.5	8.9	4.2	1.6	3.0	5.5	1.8	3.8
9	19.2	11.3	15.1	12.3	6.1	9.2	2.9	-0.1	1.6	6.8	2.5	4.4
10	18.9	11.6	15.1	14.1	9.0	11.0	4.5	2.6	3.6	6.2	2.4	4.3
11	21.1	12.5	16.5	13.4	7.0	10.2	4.3	2.1	3.5	5.4	1.6	3.5
12	22.3	15.7	18.4	12.3	8.1	9.9	3.9	1.0	2.6	5.7	1.0	3.2
13	20.3	15.1	17.4	12.8	6.2	9.3	4.2	0.6	2.5	5.5	0.8	3.1
14	18.0	14.1	15.9	9.6	5.3	7.6	3.4	2.0	2.7	5.7	0.9	3.1
15	16.4	11.1	13.6	8.8	2.3	5.6	3.7	0.5	1.8	6.0	0.6	3.3
16	16.3	9.1	12.6	11.1	3.9	7.3	2.9	-0.2	1.0	4.3	-0.2	1.5
17	17.6	11.4	14.0	11.9	5.6	8.5	4.7	-0.2	2.2	0.5	-0.2	0.0
18	15.0	11.1	12.7	12.0	6.2	9.1	6.0	1.4	3.6	3.7	-0.2	1.4
19	15.8	7.5	11.5	13.1	7.1	9.9	7.0	2.8	4.6	5.0	0.7	2.5
20	17.9	9.9	13.7	11.5	7.1	9.0	7.3	2.5	4.9	4.8	-0.2	2.0
21	14.8	8.4	10.8	7.4	3.8	5.8	5.2	3.5	4.4	2.3	-0.2	0.8
22	12.4	5.8	8.9	6.2	1.0	3.5	3.8	0.5	1.9	2.6	-0.2	0.7
23	14.5	6.5	10.3	3.1	1.5	2.2	1.7	-0.2	0.6	3.1	-0.2	0.9
24	16.1	9.0	12.4	5.5	0.7	3.0	4.1	-0.2	1.6	3.5	-0.2	1.1
25	16.2	9.2	12.6	6.5	0.8	3.5	2.8	0.7	1.9	6.3	-0.2	2.8
26	15.4	8.8	12.0	5.3	2.0	3.6	3.9	-0.1	1.8	7.3	0.9	3.9
27	13.5	8.3	10.9	7.0	0.8	4.0	1.4	-0.2	0.4	7.6	1.2	4.5
28	13.3	7.7	10.4	6.3	3.3	4.8	---	-0.2	---	10.2	5.0	7.2
29	13.8	7.7	10.8	6.5	1.1	3.7	---	---	---	6.6	2.2	4.5
30	15.1	9.1	12.0	4.8	2.3	3.3	---	---	---	6.0	0.3	2.9
31	12.7	9.0	10.8	---	---	---	---	---	---	5.7	0.2	2.7
Month	23.7	5.8	14.1	14.1	0.7	7.2	---	---	---	---	---	---

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		February			March			April			May	
1	5.9	0.0	3.0	15.7	6.3	10.8	14.7	6.6	10.6	21.1	12.5	16.2
2	7.3	2.0	4.4	12.0	4.9	8.5	17.4	5.0	10.7	14.6	8.0	11.1
3	7.4	2.4	5.0	10.0	2.4	5.8	15.0	9.5	11.8	17.4	5.3	10.8
4	9.5	3.6	6.3	12.0	2.2	6.7	18.6	7.4	12.6	20.9	8.8	14.4
5	6.6	1.1	2.8	9.9	4.9	7.1	14.4	9.2	11.6	23.6	12.8	17.7
6	3.5	-0.2	1.4	10.3	3.2	6.6	18.1	7.4	12.2	22.4	15.3	18.2
7	5.8	-0.2	2.9	7.5	3.2	5.0	14.0	7.4	10.4	19.3	14.6	16.7
8	8.3	2.1	4.7	11.6	2.3	6.6	17.6	7.6	11.5	24.3	13.4	17.6
9	8.8	1.6	5.1	13.1	5.5	9.2	12.5	8.3	9.4	23.1	13.2	17.5
10	5.9	1.7	3.0	14.3	5.5	9.8	9.0	6.2	7.8	19.2	11.6	15.6
11	6.9	0.9	3.7	15.7	5.6	10.5	11.6	4.8	7.7	20.6	8.6	14.1
12	7.5	2.8	5.0	15.9	6.7	11.0	13.7	4.9	9.0	23.9	11.3	17.3
13	10.1	1.8	5.8	15.3	8.6	11.8	17.0	5.1	10.5	19.3	12.7	15.9
14	7.7	3.3	5.4	13.8	8.2	11.0	20.6	7.6	13.5	22.4	11.1	16.0
15	7.4	0.9	4.0	14.6	5.7	9.8	21.8	10.0	15.3	19.6	13.1	15.8
16	9.4	2.0	5.5	9.9	4.8	6.0	20.1	10.9	15.0	21.3	11.0	15.9
17	6.9	3.5	5.3	6.5	4.4	5.2	13.9	8.6	10.1	24.2	13.3	18.2
18	7.0	0.5	3.8	13.3	3.7	7.8	17.5	5.8	11.1	25.4	13.2	18.9
19	9.6	1.1	5.1	15.6	5.1	10.1	19.0	9.3	14.0	26.5	14.7	20.2
20	6.7	2.5	4.0	17.4	6.7	11.8	21.7	11.1	16.0	26.6	16.3	20.9
21	6.5	1.2	3.7	17.8	8.4	12.8	20.0	10.3	15.2	24.5	14.9	19.1
22	10.3	1.8	5.8	14.9	9.0	11.7	20.9	9.7	15.0	24.3	16.4	19.5
23	11.4	4.4	7.6	15.0	6.6	10.3	21.9	12.2	15.9	24.7	14.8	18.6
24	11.6	4.0	8.0	17.0	5.8	11.1	23.7	12.2	17.6	24.2	13.4	18.2
25	9.9	6.6	8.3	17.5	7.4	12.1	19.9	11.2	15.6	24.3	13.7	18.9
26	10.9	4.1	7.2	18.0	7.1	12.2	18.6	9.7	14.1	26.4	15.9	20.1
27	11.3	3.1	7.1	17.9	8.5	12.9	18.6	8.2	13.2	20.6	13.9	17.1
28	13.1	4.9	8.8	14.3	8.8	11.2	18.7	8.9	14.1	22.6	13.9	17.2
29	14.3	5.6	9.8	17.7	6.2	11.4	19.9	10.0	15.1	27.5	16.8	21.1
30	---	---	---	13.8	7.7	9.9	22.9	11.3	16.7	28.5	17.2	22.3
31	---	---	---	15.8	6.8	10.2	---	---	---	27.2	17.4	21.8
Month	14.3	-0.2	5.3	18.0	2.2	9.6	23.7	4.8	12.8	28.5	5.3	17.5

07137500 ARKANSAS RIVER NEAR COOLIDGE, KS—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2007 TO SEPTEMBER 2008

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		June			July			August			September	
1	27.7	17.4	22.1	27.3	22.0	24.7	28.8	21.8	25.3	26.2	19.4	22.6
2	28.2	19.9	23.7	27.1	22.7	25.0	28.8	20.6	24.4	23.6	18.1	20.9
3	29.5	20.4	24.2	26.4	22.3	24.4	29.1	20.5	24.5	22.8	15.9	19.0
4	26.9	19.1	22.7	27.4	22.0	24.7	29.9	21.4	25.2	23.4	14.6	18.8
5	24.4	17.7	20.4	28.4	23.2	25.8	26.9	21.9	24.3	20.5	16.0	18.2
6	25.0	14.9	19.6	27.4	22.8	25.1	28.5	21.1	24.1	20.7	16.0	18.0
7	26.5	15.9	20.9	26.3	22.6	24.6	24.1	20.5	21.6	21.3	16.8	18.5
8	24.9	17.1	20.6	26.5	23.3	24.8	25.6	19.6	21.8	19.2	14.5	16.3
9	25.6	15.5	20.3	26.2	23.0	24.7	29.7	20.8	24.6	19.4	13.5	15.8
10	26.4	17.2	21.6	27.3	22.2	24.7	28.3	22.2	24.6	23.1	15.2	18.7
11	26.4	17.3	21.4	27.6	23.2	25.4	29.6	21.3	24.6	20.9	16.9	19.1
12	26.4	15.6	20.6	26.4	21.0	22.8	29.3	20.8	24.3	21.1	17.4	18.8
13	26.8	15.8	21.0	23.7	18.9	21.3	28.4	19.0	23.5	23.7	16.3	19.8
14	28.7	16.4	22.5	26.4	21.2	23.6	27.0	19.7	23.2	22.2	15.6	18.5
15	29.2	19.3	24.1	27.6	22.9	25.2	22.6	19.3	20.5	22.9	14.3	18.3
16	24.1	18.9	20.2	28.0	23.4	25.7	20.6	18.0	19.3	24.0	15.0	19.4
17	23.8	17.3	20.1	27.0	23.6	25.6	19.5	17.9	18.8	23.7	15.4	19.4
18	27.1	18.1	22.2	27.3	23.5	25.3	20.1	18.0	19.0	22.6	15.5	18.6
19	25.2	18.8	21.7	28.8	23.7	26.1	22.6	18.0	20.1	23.3	14.5	18.7
20	26.9	17.6	21.3	28.1	23.7	25.9	22.9	18.2	20.5	23.5	14.9	19.1
21	28.0	17.6	22.3	27.3	23.0	25.2	26.8	18.1	22.1	23.4	15.9	19.2
22	29.1	19.8	24.3	28.1	23.1	25.5	28.3	20.0	23.9	23.9	15.7	19.3
23	29.0	20.0	24.1	27.4	23.4	25.5	27.4	20.2	23.7	23.3	15.5	19.1
24	29.1	19.9	24.2	27.8	23.0	25.4	27.7	21.0	24.1	23.0	15.7	19.2
25	30.6	20.9	25.5	28.7	24.0	26.2	26.6	20.9	23.5	23.9	16.1	19.6
26	29.9	21.9	25.8	28.4	24.0	26.1	28.1	19.7	23.6	23.2	15.3	19.1
27	29.9	21.0	25.2	26.5	23.6	24.7	28.4	20.4	24.2	23.2	15.2	19.1
28	27.0	20.5	23.7	29.1	22.4	25.4	26.4	20.5	23.5	23.7	16.7	19.9
29	26.6	19.4	22.9	27.9	23.3	25.5	25.2	19.7	22.3	21.3	14.5	17.9
30	27.4	20.8	24.0	28.9	22.2	25.5	26.8	19.4	22.8	22.0	12.3	16.9
31	---	---	---	30.1	21.7	25.6	25.7	18.9	22.1	---	---	---
Month	30.6	14.9	22.4	30.1	18.9	25.0	29.9	17.9	22.9	26.2	12.3	18.9